

Untangling Uniformitarianism, Level 1: A Quest for Clarity

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Abstract

An assessment of the meaning and role of uniformitarianism in natural history is demanded by: (1) the confusion it has generated for nearly two centuries, (2) the recent revolution in geology that has rejected traditional uniformitarianism in favor of neocatastrophism, and (3) the accusation by some who embrace neocatastrophism that diluvialists—failing to understand nuances of uniformitarianism—argue futilely against the straw man of Lyellian gradualism. The first level of this much-needed assessment focuses on the semantic confusion, which is significant. Some suggest that identifying four distinct definitions of “uniformitarianism” resolves all problems. However this scheme does not go far enough: though it helps clarify the issue, it is no solution. I propose a more radical step of eliminating unnecessary terms to advance conceptual clarity. Of the nine terms associated with uniformitarianism, seven can be replaced or eliminated. This proposal refutes the accusation that diluvialists do not understand uniformitarianism, showing rather that it is the accusers who misunderstand key concepts about earth’s past.

Keywords: uniformitarianism, catastrophism, neocatastrophism, uniformity, actualism, diluvialism

Charles Lyell created a new paradigm for geology in 1830 by emphasizing a radical uniformity in nature. Though remarkably successful for over 150 years, his system has fallen into disfavor, partly because as Gould (1987) noted, he conjoined distinct concepts into what was soon dubbed “uniformitarianism” by William Whewell. Though Whewell did not mean it favorably, the term became a symbol of pride and for 150 years geologists trumpeted it as “the fundamental principle of geology” (Challinor 1968, p. 331).

But things have changed. By the late twentieth century, many geologists rejected uniformitarianism and some were calling for eliminating the term (Austin 1979; Shea 1982). Much of the clamor can be traced back to the semantic confusion begun by Lyell. Thanks to historians of science, that confusion has been lessened by a rigorous examination of the multiple concepts subsumed for many years under “uniformitarianism,” although many appear to believe that the conflicts are resolved by the mere explication of these definitions.

If this were not enough, another layer of complexity is added by the often-unstated metaphysical battle between Christianity and Naturalism. An early manifestation of this conflict was the mythology—also begun by Lyell—that recast the origin of the science of geology as a simplistic saga. Even today, the public is told that geology began when “scientific” uniformitarians (the good guys) finally triumphed over “religious” catastrophists (the bad guys) and claimed the soul of geology. This cartoonish distortion can be traced to the propaganda of Enlightenment apologists, and is, amazingly, echoed today (for

example, Repcheck 2003). Though the polemic trick of pitting “religion” against “science” proved helpful to non-theistic elements in both the earth and life sciences during the nineteenth and twentieth centuries, the logic of that position fails under scrutiny, and its propaganda is more widely recognized as such (for example, Stark 2003).

Most historians of science have little sympathy for creationism, and so modern corrections to these myths have been aimed at rehabilitating continental *secular* catastrophists, like Georges Cuvier (1769–1832), who was miscast by English geologists as a diluvialist. Early gradualists used that mischaracterization to good effect, promoting Lyell as the only hope for a “scientific” geology free from biblical “literalism.” It is small wonder then that when modern creationism emerged in the 1960s, that it was confronted once more by this old canard. But it is fortunate that recent studies (for example, Gould 1984, 1987; Hooykaas 1963, 1970, 1972; Rudwick 1997, 2005, 2008) have begun to correct many of the more flagrant historical inaccuracies, through many practicing geologists and diluvialists probably remain unaware of these works. Not only does the historical work demand revision from the Christian point of view; the easy identification of these myths suggests that others remain to be uncovered.

So despite their progress, secular historians are prone to focus on the debate between secular catastrophism and secular gradualism, while ignoring the elephant in the room—the Genesis Flood. It holds that position because of its influence on early geologists who opposed it, and because of its modern revival. Despite significant religious bias, the debate

over the nature of earth history is thus a three-sided argument between:

1. Those who accept the biblical narrative as history. In the context of discussing earth science, I will henceforth refer to them as *diluvialists*.
2. Those who reject the biblical narrative out of a commitment to Naturalism. To avoid confusing them with diluvialists who are also geologists, I will henceforth refer to them as *secular geologists*.
3. Those who seek to blend the first two positions. I will henceforth refer to them as *accommodationists* because they wish to integrate the two positions.

The accommodationists are the most complex group; they must affirm the basic truth of Christianity and the Bible while simultaneously creating textual and theological reasons for ignoring the clear historical narrative in Genesis. They are typically enthralled by science, urging the superiority of “natural revelation” over “special revelation.” This position has become more tenuous in recent years for several reasons. First, early arguments on their part that accommodationism was a significant theological position in church history have been disproven. Second, the theological errors inherent in the accommodationist school deviate from the traditional (and virtually monolithic) beliefs of the church prior to the Enlightenment (for example, Hall 2008; Kulikovskiy 2009; Mortenson and Ury 2008; Sarfati 2004).

Accommodationists also face problems on the secular side. Their scientific case stands or falls with that of their secular colleagues. But that case changes regularly, and occasionally the changes are significant. Thus, having traded the certainty of Scripture for what they perceived was the greater certainty of science; could they end up losing both? Despite these drawbacks, the position remains popular among Christians in academia. An example is Dr. Davis Young, an emeritus geology professor at Calvin College, well known for his 1982 book, *Christianity and the Age of the Earth*.

He recently released another with Dr. Ralph Stearley, also of Calvin College, through InterVarsity Press (2008), entitled *The Bible, Rocks, and Time*. In their chapter 16, “Uniformitarianism, Catastrophism, and Empiricism,” they argue:

(A)

Proposition: Creationists oppose uniformitarian geology

Proposition: Creationists define uniformitarian geology as extreme gradualism

Proposition: Modern geologists are neocatastrophists

Conclusion: Therefore, creationists oppose a “straw man”

But by extensive citations of Dr. Steven A. Austin’s (1979) paper, which cogently discusses the multiple meanings of the term, they are forced to derive a separate “anti-Austin” corollary:

(B)

Proposition: Austin opposes uniformitarian geology

Proposition: Austin agrees with geologists’ definitions of uniformitarianism

Conclusion: Therefore, he has no real argument

Clearly the second syllogism diminishes the first. Furthermore, their selective citation of sources that are both old and of questionable relevance does nothing to increase confidence in their case. Of thirty distinct citations in their chapter, ten were old references by Henry Morris, and nine others were of two publications by Austin (1979, 1994). Relevant works by Froede, Klevberg, Mortenson, Oard, Reed, Silvestru, Snelling, Walker, and others were prominent by their absence.

Another flaw flows from the unintended consequences of their argument. If geology was built on a foundation of gradualism and that foundation has been rejected, what can be said for the integrity of geology as a discipline? It seems analogous to the proverbial man who left his wife for his secretary. How can the secretary have any confidence that he will remain faithful to her? If geology so easily casts aside its “fundamental principle,” then common sense suggests that: (1) anything built on the original foundation is now suspect, and needs to be reviewed, revised, and/or rejected; and (2) that the new “foundation” might be equally uncertain. Where does that leave geology as a science? Bringing geology into line with the new neocatastrophism may be harder than it appears. Simply identifying the vast number of propositions built on gradualism is a daunting task: evaluating, revising, and/or replacing them is even more so. Baker’s (1998) argument that Lyell’s error was fundamentally one of a faulty scientific method makes the task even more challenging.

Contrary to Young and Stearley (2008), the resurgence of secular catastrophism is not news to diluvialists. But what *is* interesting (and what Young and Stearley appear to miss) is the reaction among the rank and file of secular geology. This “revolution” seems to have generated little more than a sigh of relief that the increasingly-difficult-to-ignore evidence of catastrophism in the rock record can be explained without recourse to the Flood—a clear indication of metaphysical bias. So even after its apparent death, uniformitarianism remains unburied—like a zombie that still continues to stalk geology.

For all of these reasons, diluvialists need to reassess uniformitarianism and the new catastrophism. All three parties must overcome what Gould (1987) called the “cardboard empiricist myth,” uncover the historical truth, and assess that information from their distinct philosophical perspectives. Diluvialists must also clarify their philosophical position *vis à vis*

their early emphasis on “scientific” creationism—a strategy designed to allow a small, poorly-funded group to catch the attention of a thoroughly positivistic culture. Fortunately, many Christians are beginning to focus on a broader perspective (for example, Lisle, 2009; Noebel 1991, 2001; Pearcey, Thaxton, and Olasky 1994; Pearcey and Johnson 2008; Reed 1998; 2001; 2005; Reed et al. 2004). But before any of these issues can be addressed, it is necessary to clean up the semantic mess bequeathed by secular geology. Conceptual clarity about “uniformitarianism” requires first that we find clarity in terminology.

That requires working within the narrow confines of secular geologic method. Before diving in, an important distinction must be drawn. Secular geologists confine their discussions about uniformitarianism to method because their positivist epistemology so directs them. As a Christian, I reject their approach, but am willing to play on that field for the purpose of this paper. I intend to show in subsequent papers that the *concepts* associated with uniformitarianism require a broader epistemological focus. It might be helpful to picture *geologic method* as merely one small room in the house of human knowledge. If we think of truth as the air that circulates throughout the structure, it becomes clear that while the walls are necessary to distinguish one room from another, it is not helpful to try to seal them off from the others, as positivists have historically done. If the “air” from other rooms is shut off, anyone stuck in the room of *geologic method* will suffocate.

But, first things first. There is abundant semantic confusion to be resolved, and this paper will focus on this narrow question (fig. 1). That requires that we examine the various meanings of “uniformitarianism” and related terms such as “actualism” and “uniformity,” leaving the conceptual investigation for another paper.

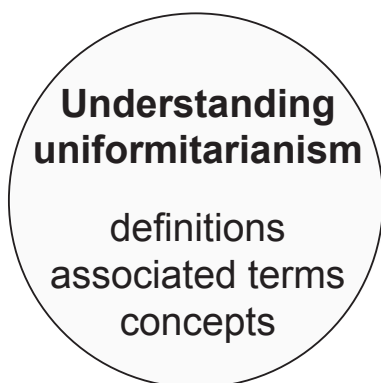


Fig. 1. Uniformitarianism is best understood in a broader context than that of most secular geologists and accommodationists like Young and Stearley (2008). However, before branching out, the jumble in the zone of geologic method must first be set right.

As an example of the confusion that needs to be cleared up, Young and Stearley (2008 p.470) fixate on the so-called “false dilemma” between “uniformitarianism” and “catastrophism,” which they attribute to diluvialists:

... it is disturbing that young-Earth advocates persist in referring to modern geology as uniformitarian in the sense that it rejects the possibility of large-scale catastrophic events and insists on appealing to modern gradualistic processes to explain all geologic phenomena. We challenge young-Earth creationists to abandon the fruitless dichotomy between so-called uniformitarians and catastrophists. It is a false and useless dichotomy in which a straw man is erected for the purpose of demolition...

As I will show at the end of this paper, it is Young and Stearley (2008) who miss the true dichotomy between secular geologists and advocates of biblical history, creating their own straw man. All three parties—secular geologists, diluvialist, and accommodationists—will benefit from correct and consistent definitions of these terms.

Understanding Uniformitarianism: The Narrow Sense

Uniformitarianism is an idea that appears simple at first glance, perhaps due to its catchy longtime motto: *the present is the key to the past*. Until quite recently, introductory geology students were fed that motto like mothers’ milk. For decades, geologists were trained to see present-day processes operating at present-day rates as comprising the reservoir of explanations for the rock record. Extant depositional environments were extensively investigated to provide clues to ancient sedimentary rocks (for example, Blatt, Middleton, and Murray 1981; Reineck and Singh 1975; Scholle 1982). A less sophisticated approach had been in use long before. Lyell extrapolated the age of Niagara Falls (incorrectly) from observed erosion rates. Powell and others guessed at the age of Grand Canyon assuming slow, steady erosion by the Colorado River. It is interesting, then, that Young and Stearley (2008, p. 451) condemn Brown (2008) for repeating the motto when it appears in virtually every textbook of geology ever written. Windley (1993) referred to it as “the uniformitarian paradigm” of James Hutton. Recently, it has fallen out of favor because of its intimate association with gradualism. Even so, Gould (1984, p. 16) was honest enough to admit that:

... many geologists have felt that a belief in slow and steady change defines the necessary practice of their success...

But the reality of uniformitarianism is much more complicated, especially since the features of the rock record have always been better explained by non-gradualistic processes (for example, Ager 1973, 1993;

Gould 1987; Rudwick 1997, 2005, 2008). Geologists seemed content to live with that inconsistency until recent decades. Hooykaas (1970, p.315) noted the essential problem:

Consequently, the conceptions of the scope and contents of the Principle of Actuality ... are widely divergent: they run from strict uniformity of all geological causes (in the Lyellian sense) to such a trivial general verdict as that of the “immutability of the laws of physics.”

Shea (1982, p.455, emphasis in the original) exhibited his frustration at that lack of clarity in a pungent analysis:

Ask almost any geologist and you will be told that uniformitarianism is *the* basic principle of geology Beyond that, however, inquiry about this principle is likely to elicit an astonishing array of vague catch-phrases, half-truths, and outright fallacies. Similarly, geological books, journal articles, textbooks at all levels, dictionaries, and encyclopedias are riddled with misconceptions and fallacious statements of and about uniformitarianism. It is apparent that *most geologists do not understand the nature and correct meaning of what is said to be the basic principle of their science.*

Thus, one of Young and Stearley’s key propositions—that diluvialists do not understand uniformitarianism—can be easily turned around by simply pointing out that even where it might have been true that the diluvialists were merely following their secular colleagues!

Young and Stearley (2008) are partly correct (but hardly original) in discussing the semantic complexity of “uniformitarianism,” but their appreciation for its *real* complexity falls short. Their intricate discussion of the multiple sub-meanings of the word concludes with nothing more than the fallacious propositions that diluvialists are unaware of those nuances, and that neocatastrophism resolves conflicts between the Bible and secular prehistory. A subjectivist thread appears in their constant referral to the opinions of “modern geologists,” rather than to actual concepts within the discipline. Finally, their treatment of the history of “uniformitarianism” is misdirected at diluvialists’ supposed misunderstanding of the term, and the “false dichotomy” between “uniformitarianism” and “catastrophism.” Ironically, their “false” dichotomy is shown by their own discussion to be identical to that drawn by generations of *professional geologists*, and only recently corrected by historians of science.

Despite these weaknesses, they are to be complimented on opening the door to a much needed discussion of Christianity, history, and “prehistory,” because there is much wreckage over the past two centuries to untangle. Christians need to understand and appreciate the *real* dichotomy—history with God

or without Him—and the way that choice has twisted science, history, philosophy, and theology for far too many years. New historical work is helpful, especially that of Dr. M. J. S. Rudwick, but a comparable analysis from a Christian historical viewpoint is still lacking. But those issues are reserved for following papers in this series, so now we turn to the semantic mess. First, we must resolve the confusion introduced by the multiple meanings of “uniformitarianism,” and then deal with the added confusion stemming from the use (and misuse) of the synonym “actualism,” and the prior term, “uniformity.”

Solving semantics

For more than a century after Lyell’s triumph over secular catastrophism and the Scriptural Geologists (Mortenson 2004), his vision of earth’s past sailed majestically forward, especially after being reconciled to Darwin’s directionalism. It was not until the 1960s and 1970s that “uniformitarianism” came under renewed scrutiny (Albritton 1963, 1967; Gould 1965; Hooykaas 1963, 1970; Rudwick 1971, 1972; Simpson 1963, 1970; Whitcomb and Morris 1961). Evidence from the rock and fossil records made it clear that the Lyell/Darwin synthesis of slow, gradual evolution was as untenable as the primary fallback position of retaining as much gradualism as possible under the cover of invariant natural law, while admitting as little catastrophism as necessary (Reed 1998). In speaking of uniformitarianism, Simpson (1963, p.31, emphasis added) illustrated that essential tension:

It is commonly defined as the principle that the present is the key to the past. That definition is, however, so loose as to be *virtually meaningless in application*. A new, sharper, and clearer definition in modern terms is needed.

That was echoed by Hooykaas (1963, p.XIII):

Strangely enough, while there is a vast literature on the history, the logical meaning, and the metaphysical background of the principle of causality, there is a general neglect of similar topics with regard to the principle of uniformity, which is of such great importance for the modern world view. The history of uniformitarianism has never been written; its philosophical examination has been restricted to a few articles: there exists no monograph on the fundamental principle of the “historical” natural sciences.

Typical of the mid-twentieth century positivism, Simpson (1963, p.32) then attempted an empirical argument for something (the past) that cannot be observed:

As to the second major point originally involved in uniformitarianism, there is no *a priori* or philosophical reason for ruling out a series of natural worldwide

catastrophes as dominating earth history. However, this assumption is simply in such flat disagreement with everything we now know of geological history as to be completely incredible.

In retrospect, we can see that it is only Simpson's dogged faith in his materialistic version of science that proved "incredible." His logical error was soon joined by others of an empirical nature, when Ager (1973) presented a totally different perspective on the rock record. Simpson (1963, p.33), seeming to sense that coming storm, retreated to safer ground:

Then what uniformity principle, if any, is valid and important? ... the postulate that immanent characteristics of the material universe have not changed in the course of time.

By which he meant natural laws did not vary. But that says very little about *geological* history and Simpson (1963, p.33, brackets added) clearly felt the force of that imprecision:

Past configurations [geological settings] were never quite the same as they are now and were often quite different. Within those different configurations, the immanent characteristics [natural law] have worked at different scales and rates at different times, sometimes combining into complex processes different from those in action today. The uniformity of the immanent characteristics helps to explain the fact that history is not uniform. Only to the extent that past configurations resembled the present in essential features can past processes have worked in a similar way.

Given the nearly infinite number of possible "configurations" over deep time, and lacking any geological principle with which to deduce them from the scanty evidence of the rock record, it is obvious that Simpson's confidence was misplaced.

By the late 1960s, it was clear that uniformitarianism was inherently confusing. Merely asserting gradualism as a part of invariant natural law—a habit begun by Lyell—could never explain the phenomena of the rock record. Yet questioning gradualism would open the door to the bogey man of catastrophism, which Enlightenment polemicists had assured intellectuals for years was closely linked to the dreaded biblical "literalism." For decades, Lyellians had argued that catastrophism and biblical history were inevitably linked, and thus generations of geologists were trapped by their own mythology. Simpson (1963) unwittingly illustrated the real tension of uniformitarian geology—the need for "scientific" certainty for unique unobserved events. This "need" was part and parcel of Naturalism, which had displaced biblical history with "science," which most nineteenth century people associated with Newtonian physics. But scientific certainty requires a clear path of predictability from present observation

to past event via relics of the rock record that is both quantitatively sufficient and sufficiently obvious to support the weight of hard science.

Geologists knew that the limited definition of uniformitarianism as invariant natural law, however helpful it might be for public relations, did not capture the full meaning of the term as they applied it. When historians of science (for example, Hooykaas 1963) pointed out that Lyell and his progeny had always meant much more than that, action had to be taken. A shared Kantian view of reality kept their analysis squarely inside the positivist limits of scientific method, but problems with positivism itself only exacerbated their plight. During the 1960s and 1970s, the struggle devolved to a consensus position around four distinct definitions of "uniformitarianism." It was taken for granted that this semantic solution clarified the conceptual confusion begun by Lyell.

Young and Stearley (2008) discuss these four definitions, but fail to see that this semantic consensus does not solve the real difficulties. So, along with their secular colleagues, they resort to a strategy of pretending that semantic discussion—combined with an enthusiasm for neocatastrophism—solves the problem. But it is in everyone's interest to address problems, not to mask them. The first step, taken in this paper, will be to address the terminology. Dealing with the concepts behind the terms is reserved for the following parts of this series. Therefore, after recapping the "four-definition" solution, a proposal will be made to reduce the four to one—allowing simplicity to provide a much-needed clarity and a start down to the road to unraveling problems tied to the underlying philosophy of Naturalism, which is real reason that creationists have always opposed uniformitarian history.

As an aside, I briefly note the historical coincidence between the upsurge of interest in "uniformitarianism" and the publication of *The Genesis Flood* in 1961. Although Gould (1984) fancied that Kuhn's (1962) classic treatise on science and various other "revolutionary" trends in modern thought awoke geologists, the deafening silence about the impact of Whitcomb and Morris' book suggests that there is more there than meets the eye. But such questions are best left for future historians of science. I simply note this curious synchronicity. While it is true that the evidence in the rock record was pushing towards a catastrophic component, it is also true that similar phenomena were known by geologists all the way back to the days of Cuvier, and despite Young and Stearley (2008) making much of the work of Harlan Bretz, they minimize the real lesson of his work—the dogmatic opposition by gradualists over five decades *in spite of compelling field evidence*.

The four definitions

“Uniformitarianism” has historically been defined as everything from invariant natural law—a prerequisite for empirical science or empirical history (Flew 1997)—to Hutton’s curious ahistorical “earth machine” (Gould 1987) to Lyell’s directional, yet gradual deep time, to Ager’s (1973) colorful analogy between geohistory and the life of a soldier. Young and Stearley (2008) recognized, as have numerous secular historians of science, that some order must be brought out of this chaos, and to do so they compared analyses by Gould (1975, 1984), Rudwick (1971), and Austin (1979). Austin, being a diluvialist, might seem an anomaly in the group, but his analysis proved cogent—even to Young and Stearley. While they make much of the similarities between his analysis and those of his secular colleagues, it is worth noting that he was writing in a narrow fashion for a secular audience, unable to draw explicit connections to diluvial geology as this would have undoubtedly prevented the article’s publication (cf., Bergman 2008).

Geologists and historians of science, recognizing the inherent imprecision in the term, began to address what had been considered the “foundational principle of modern geology.” Following the Dutch historian of science, Professor Reijer Hooykaas (1963), others (for example, Gould 1965) drew distinctions between different kinds of “uniformitarianism” to help eliminate more than a century of ambiguity. Table 1 shows the four categories discussed by Young and Stearley (2008) and the terminology used by different authors.

Gould (1965) popularized the use of the adjectives “methodological” and “substantive” to help clarify the multiple meanings of uniformitarianism. He then (1975, 1984) acknowledged Rudwick’s (1972) contribution, noting that he could “unpack” four different concepts from one word. For ease of discussion, we will follow his (1984) terminology, seen in the first column of Table 1.

One notable exception to this four-fold division of uniformitarianism was renowned evolutionist George Gaylord Simpson. In two papers (1963; 1970), he took exception to what he saw was an analysis that was too simple to capture the conceptual nuances:

There are a number of issues, such as that of gradualism-catastrophism, historically important and still debated in one form or another that are not taken into account. An example even more important is the complex of issues involving historicism, retrodiction, and explanation, here to be referred to later. Another source of possible continuing confusion is that the two sides of the dichotomy as sometimes presented are not clear-cut. Moreover, each of the alternatives offered is still somewhat ambiguous. For instance the invariability of natural laws is indecisive about such basic problems as their sufficiency or as to whether the actions of all historically relevant laws are currently (“actually”) observable. The definitions of uniformitarianism by Hooykaas and of substantive uniformitarianism by Gould, further, raise what is to some extent, at least, a *Scheinproblem*, [a pseudo-problem] because they are more rigid or extreme than the view of Hutton, Lyell, or most of their followers (Simpson 1970, pp. 58–59, brackets added).

Many of Simpson’s objections push the boundaries of geologic method, especially in areas of metaphysics and epistemology, and so will be addressed in other papers about those issues.

1. Uniformity of Law

Gould (1965, 1975, 1984, 1987) correctly noted a wide agreement over the first meaning of uniformity (Table 1), called it “an *a priori* methodological assumption made in order to practice science ...” (1984, p. 11). This followed his treatment of the subject in 1965 (p. 226):

However, the assumption of spatial and temporal invariance of natural laws is by no means unique to geology since it amounts to a warrant for inductive inference which, as Bacon showed nearly four hundred

Table 1. The “four-definition” approach to “uniformitarianism,” as presented by Young and Stearley (2008).

	Gould (1975, 1984)	Rudwick (1971)	Austin (1979)
Methodological	uniformity of law <i>a priori</i> claim about science; laws same over time, space	theological status primary act of God secondary, “naturalistic” manifestation	methodological uniformitarianism agreed with Gould that this is an <i>a priori</i> claim about science
	uniformity of process actualism	methodological status past geologic causes same as present; “actualistic” versus “non-actualistic”	causal uniformitarianism argued for both known present causes, unknown present causes, and unique past causes
Substantive	uniformity of rate gradualism	rate gradualistic or saltatory	actional uniformitarianism uniformity of process rates
	uniformity of conditions non-directionalism, dynamic steady state	“pattern” of past geological cause steady-state or directional	configurational uniformitarianism steady state conditions through time

years ago, is the basic mode of reasoning in empirical science. Without assuming this spatial and temporal invariance, we have no basis for extrapolating from the known to the unknown and, therefore, no way of reaching general conclusions from a finite number of observations. (Since the assumption is itself vindicated by induction, it can in no way “prove” the validity of induction - an endeavor virtually abandoned after Hume demonstrated its futility two centuries ago).

Note the similarity to Simpson’s (1963, p.33) definition:

Then what uniformity principle, if any, is valid and important? ... the postulate that immanent characteristics of the material universe have not changed in the course of time.

But Gould—at variance with his usual incisive intellect—abandoned the question too soon. What he and other positivists must ask is: *How is uniformity justified?* Simpson (1963, p.33, emphasis in original) at least attempted an answer:

Uniformity, in this sense, is an unprovable postulate justified, or indeed required, on two grounds. First, nothing in our incomplete but extensive knowledge of history disagrees with it. Second, only with this postulate is a rational interpretation of history possible, and we are justified in seeking—as scientists we *must* seek—such a rational interpretation.

Gould was a deep thinker, but perhaps his Marxist presuppositions got in his way. Coupled with his NOMA proposal—putting religion on a reservation—serious metaphysical or theological consideration of the question would have been precluded, so in that sense, we can understand why he missed the obvious. But the essential problem cannot be so easily avoided:

How can a naturalist justify the axiom of uniformity of natural law? ... As noted earlier, the materialist side of naturalism is consistently accompanied by its handmaid, positivism. Unfortunately, the positivist faces a major dilemma. His epistemology requires an empirical test of validity, by which he isolates science as the only path to truth. But scientific principles can only be extrapolated into the past (or future) by the presupposition of uniformity, and that presupposition cannot possibly be justified empirically. The naturalist, still caught in his logical trap, must deny one of his major presuppositions—positivism or uniformity (Reed 1998, pp.162–163).

Thus, as Gould acknowledges, Simpson’s first answer is logically untenable and his second, like Gould’s, reduces to question-begging.

Rudwick (1971, p.211), in contrast, noted that theology was a part of the equation:

First, there is the *theological status* of past geologic “cause,” in relation to the creative activity of God. It might be *naturalistic*, achieved by “secondary” or “intermediate” means and therefore potentially

within the realm of positive knowledge.

Note the equation of “naturalistic” actions, open to “positive knowledge” with the well-established theological principle of God’s use of secondary means to accomplish his will. But Rudwick seems to use it in more of a deistic sense than the Reformation meaning familiar to Europe prior to the Enlightenment—ignoring the divine will and direction behind the actions, and instead focusing on the ability of man to comprehend the actions through science. But at least he allows the possibility of theism.

Young and Stearley (2008, p.460, italics theirs) curiously pass up this golden opportunity to discuss the theological issues and simply agree with Gould’s assessment:

Closely related to Rudwick’s first category is Gould’s first sense of uniformitarianism, namely, the *uniformity of law*, which “is not a statement about the world” but an *a priori* claim of method that is necessary for the practice of all natural sciences that natural laws are invariant in space and time.

Though they note later (p.463) that uniformity is congruent with Christianity, they fail to make the connection between this fact and the intractable problems that this essentially *theological* issue creates for their atheist and agnostic colleagues. Secular geologists, without a shred of philosophical cover, can do no more than cling to uniformity as a naked assumption—wishful thinking, to the cynical. Opting for diversion, Gould—like Simpson—noted that science was not possible absent the assumption, but that doesn’t answer the question—it only ups the ante.

What they all fail to mention is that the origin of uniformity in science was deeply rooted in theology (Glover 1984; Hooykaas 1972), which justified the scientific presupposition as long as theology was: (1) considered a valid avenue to truth, and (2) connected (even indirectly) to science. The Enlightenment rejection of that connection—epitomized by Kant’s division of reality into the noumenal and phenomenal realms—left scientists and historians high and dry. They had to assume uniformity was true, but could not longer offer any reasonable justification. Their inconsistency eluded notice only because uniformity was readily taken for granted by Westerners soaked in the Christian worldview.

2. Uniformity of Cause

Uniformity of cause is probably the most important definition on the table because the first is an axiom of science in general, and the third and fourth have been rejected. Thus, secular geology clings to this definition as their only hold on natural history. For that reason, the conceptual basis of this second uniformity and its correlative “actualism” will be addressed later in

this series. For now, we must be content to examine the semantic issues, and to illuminate some of the questions raised by belief in this notion.

Though similar to the first uniformity, the second deals with geological causes, not physico-chemical laws. These are less precise, as seen in Simpson's (1963) struggles to relate "immanent" (physico-chemical laws) and "configurational" characteristics (geological actions). The underlying assumption is that Newton's parsimony of causes extends to geological "forces," though a compelling demonstration of that assumption is not possible, in part because there is no hard definition of these "forces." Since we cannot know that *only* those geological causes operating today operated throughout history, this "uniformity" is also treated as a presupposition of method:

Strict uniformitarianism may often be a guarantee against pseudo-scientific phantasies and loose conjectures, but it makes one easily forget that the principle of uniformity is *not a law*, not a rule established after comparison of facts, *but a methodological principle*, preceding the observation of facts ... It is the logical principle of parsimony of causes and of economy of scientific notions. By explaining past changes by analogy with present phenomena, a limit is set to conjecture, for there is only one way in which two things are equal, but there are an infinity of ways in which they could be supposed different (Hooykaas 1963, p.38).

This of course leads to a consideration of how to relate this axiomatic method to speculative systems; how the types of geological causes can be narrowed down to only those observed in the present (though perhaps operating in the past at different rates). Hooykaas (1963, 1970) is helpful in discussing

the different options (Table 2). He first separated actualistic from non-actualistic approaches, before subdividing them according to the "kinds" and "energy" of geological causes.

If nothing else, this analysis shows the wide variety of methodological approaches that could be labeled "actualistic." Hooykaas (1970, p.275) recognized this potential:

In that case one might speak of ancient geological causes (dependent on an ancient geological situation and therefore only possible in the circumstances of the ancient world), and yet maintain that these are to be explained in an actualistic way, that is by physical forces similar to those active now. Thus actualism may be maintained on the level of physics, whereas, under the pressure of the evidence of geological observation, it is taken less strictly on the geological level.

Hooykaas' explication of the difficulty of applying this second uniformity removed a false sense of certainty that had plagued geology for more than a century. It places certainty back onto the first uniformity and shows that any certainty in geologic interpretation rests only on the first uniformity. Both secular neocatastrophists and diluvialists have opted for this approach (although for different reasons), allowing much of any given historical event to be open to forensic investigation using principles of science, rather than vague geological "forces." In that sense, catastrophists are no less actualistic than the strictest uniformitarian. Hooykaas (1970, pp.315–316) recognized the vast difference between definitions of uniformity pertaining to method and those pertaining to assumptions about historical reality:

The term "uniformitarianism", however, should be restricted to theoretical systems like those of Hutton

Table 2. Hooykaas (1963; 1970) discussed the potential classifications of geological causes with respect to their "kind" and "energy." He is careful to distinguish between the method of applying observed causes (actualism) and the resulting systems (uniformitarianism, catastrophism, and evolutionism) that can result from applying the actualistic method.

Non-Actualistic Conceptions	Actualistic Conceptions	
non-actualistic conceptions <i>geological causes</i> <i>kind</i> different <i>energy</i> different	(pure) actualism <i>geological causes</i> <i>kind</i> not different <i>energy</i> different	historically based on cooling earth with decreasing energy; proposed discontinuous outbursts superposed on continuous processes (actualistic catastrophism)
(non-actualistic uniformity) <i>geological causes</i> <i>kind</i> different <i>energy</i> same	uniformitarianism <i>geological causes</i> <i>kind</i> same <i>energy</i> same	strict uniformitarianism steady-state condition, events are repeated throughout epochs (Hutton and early Lyell) evolutionism uniformity in change of events, not in events themselves (Darwin and later Lyell)
	(actual method; not system) <i>geological causes</i> <i>kind</i> same, but not all <i>energy</i> same	new causes appear over time; thus, not all present causes are needed to explain events of the past

and Lyell, and to the rigid conception of the actualistic method as applied by those fathers of geology, that is, connected with the hypothesis of an almost perfect equality of causes at all times. *Actualism*, on the other hand, covers a wide range of theories ... that go together with the methodological principle of being as “actualistic” as the geological facts admit: a principle which finds a more rigid application in a uniformitarian system than in that of catastrophism ... a principle, however, that never should have its contents dogmatically fixed *a priori*.

It is extremely important to note here Hooykaas’ rejection of an absolute actualism, when he states that the method should be constrained by the facts of geology. This small distinction, if faithfully applied to historical geology, would allow a recognition that widely divergent theoretical systems can operate under common methodological rules. That might be the key that would allow discussion of various systems, including Flood geology, without the antagonistic dogmatism that currently prevails.

Austin (1979, p.28) also emphasizes the problems that can arise from too rigid an application of this type of uniformity:

Care must be taken, however, not to overemphasize the value of casual uniformitarianism as a statement of geological method. The present is not *the only key*, and, in some specialties, not necessarily *the main key* to understanding the past.

He noted several different approaches to inductive reasoning about the past, commenting favorably on that which traded a rigid certainty for a more realistic mode of geological reasoning:

They recognize unusual ancient processes, undiscovered processes, and inversions of actualistic reasoning as important problems for causal uniformitarianism. The geologist’s technique in deciphering ancient processes, they affirm, relies not only on analogies with products of modern geological processes, but on analogies with products of similar ancient processes, on analogies with products from experimental replicas and other non-geological systems, and on logical deductions from theories or scientific laws. Proper interpretations of ancient processes should, they say, involve complex techniques of inference, not just simple one-to-one association of products of modern and ancient processes. By using complex inference techniques, the geologist retains the maximum flexibility when confronted with anomalous facts, the proper perception of which is probably the crucial step in the act of scientific discovery (Austin 1979, p.39).

Gould (1984, p.11) simplified the issue, noting that his “uniformity of process” (Table 1) was also an assumption: “As such, it is another *a priori* methodological assumption shared by all scientists

and not a statement about the empirical world.” That position is convenient in avoiding the kind of critical discussion generated by Hooykaas, but weakens the necessary correlation between the application of this method to natural history and truth. Thus, what Lyell thought a principle inherent to science is admitted by Gould to be no more than an assumption!

Again, Young and Stearley acquiesce to Gould’s definition but miss significant opportunities to discuss the nature of such an “*a priori* methodological assumption” in terms of their Christian view of truth. First, they do not seem to understand that when they agree with Gould’s assessment, they have dismissed any revelatory constraint. Christians who are scientists, but who opt for the truth of Paul’s assertions in Romans 1 regarding the path of reasoning from Creation to the Creator rather than Kant’s separation of the natural and supernatural, cannot agree that this uniformity of process is absolute across history. That, of course, is the fundamental distinction between Christians and materialists. Diluvialists must affirm historical discontinuity because they have a direct historical source (the Bible) that plainly describes them in: Creation, the Flood, and the world’s end, all linked in 2 Peter 3. And there are more; from the destruction of kingdoms to the salvation of a widow and her children through an inexhaustible supply of food. As Hooykaas (1972) notes, the biblical view of reality is of *Providence*, a doctrine that stresses God’s immanence and where even the mundane workings of nature are perceived as wonders. And the doctrine of Providence makes God absolute in history, not “methodological uniformitarianism.” Christians cannot accept this non-theistic mechanistic backdrop, even if it allows miracles as inconvenient interruptions. If they do, they have already lost the battle for correctly comprehending the past.

It is interesting that even secular thinkers have grave doubts about Lyell’s approach to uniformity as a method. Baker (1998), following Laudan (1987), questions Lyell’s approach, rejecting his template of Newtonian physics for the historical sciences. Baker describes how Lyell embraced Herschel and Newton’s physics-based model of *vera causa* and enumerative induction. *Vera causa*, the method of determining which existing causes were sufficient to produce a given effect, had a firm tradition in Newtonian physics. Baker (1998) argues that Lyell believed that *vera causa* supplied the only logical basis for enumerative induction, and that this combination drove him inexorably to uniformity as being necessary for the validity of any geologic interpretation. Hooykaas (1970) noted that Lyell’s link between an actualistic method and his uniformitarian system was not inherently necessary.

Baker’s (1998) analysis is interesting because it

highlights Lyell's search for a rigid scientific certainty in his rigid uniformity (of method):

Lyell sought to rid geology of error and inconsistency to allow it precision in explanation according to strict rules of logic, indeed to put geology on the same strong logical grounds as the sciences of controlled experimentation. Physics was the exemplar science for Lyell . . . (Baker 1998, p. 178).

So we must ask: (1) why this was so, and (2) why, as Baker (1998, p. 176) notes, it took 150 years for Lyell's competitors to "be recognized as actualistic catastrophists"? As Table 2 shows, there is no compelling reason within actualism itself that would require the association.

Baker's (1998) analysis is interesting, but ignores human motivation. Differences over scientific method certainly generate passion, but the intensity and duration of that passion in Lyell and his followers suggests a deeper motive. Why did they need the certainty of physics? I would suggest that the answer can be found by identifying the object of their fear. Clearly, that was biblical history, which over the years was attacked, denigrated, ridiculed, and dismissed. During the early nineteenth century, there was still a strong residual sense of Christianity in Europe. The great religious debates of the Reformation and Counter-Reformation were over, but the Puritan tradition in England was only a century removed. Revival swept England during the eighteenth century in the form of Wesleyan Methodism, as it swept across America in Whitefield's preaching and Edwards' "Great Awakening." Though these movements did not affect the intellectual world to the extent of the Reformation, they were potent social forces. Biblical literacy was universal and Lyell would be unable to dislodge faith in the Genesis account without a superior alternative. He evidently thought that the certainty of Newtonian physics would serve, especially when combined with the subconscious appeal of uniformity to a war-weary Europe.

This brings us to the real problem with the definition and use of this second uniformity. It is not an assumption merely of scientific method, but it *unavoidably* includes metaphysical and theological assumptions. As any scientist knows, the initial conditions of any experiment are a necessary part of interpreting the results. Likewise, whether earth was created, self-created, or has existed eternally is relevant to its subsequent history. Avoiding the issue of origins was one of the strategies of the Enlightenment deists and atheists that gave them intellectual cover to deny the Flood and Earth's youth. However, it is a logical fallacy to believe that only the affirmation of Christian truth is a religious position. Its denial is equally religious, equally metaphysical, and equally outside the bounds of science. Schlossberg

(1983) noted that people who reject Christianity always substitute something else. This explains the tendency of everyone from Lyell onward to conflate the methodological principle of uniformity into the *law* of uniformity, as was noted by Hooykaas (1963, pp. 38, 39, 40):

Although he did not make the mistake of speaking about a "*law of uniformity*", Lyell's conception of the *principle* of uniformity certainly showed a tendency in this direction Thus it is possible that the investigator finds so many cases confirming, or at least not contradicting, his conception of the uniformity of geological processes, that he becomes convinced that it is a law of nature. Time and again such a law has been specified in one way or another. This should not be considered as a confirmation of the methodological principle, for this principle logically precedes the geological investigation, as the principle of causality logically precedes all scientific research He who has the idea of uniformity in his mind, is determined to find and indeed does find some kind of uniformity in nature There is a great danger that a methodological attitude may degenerate into narrow dogmatism . . .

This "narrow dogmatism" has been exhibited repeatedly by secular geologists over the past two centuries. Once it is clear that issues outside of science are involved, we see that Gould's definition of this second uniformity fails in the same way as his definition of the first uniformity—he cannot justify the assumption. Lyell's attempt to do so by reference to Newtonian physics also fails, because of inherent differences between the two disciplines. And there is no doubt why secularists over the years have avoided this issue—it leads unavoidably to origins and its associated metaphysical issues. That may have been why Enlightenment secularists attempted to ignore origins, knowing the metaphysical morass that awaited them. But how something originated is logically determinative of how it exists in the present, and thus, their strategy was doomed to failure.

That brings us back to Young and Stearley (2008). By failing to assert the necessity of Christianity, they fail to engage the uniformity of method at the heart of the issue. For this uniformity cannot possibly be true absent the regularity of the cosmos, and we have no confidence in this regularity (especially over billions of years) apart from the character of the Creator. Only an absolute God can justify uniformity as a method, but in doing so, He displaces the *method* as absolute. Since the same God reserves the right to immanence in His creation, exceptions to this second uniformity are inevitable.

Secular science has demonstrated a clear aversion to the theological nature of uniformity—in marked contrast to the pioneers of science like Kepler and

Newton, who embraced it (Hooykaas 1972; Glover 1984; Stark 2003). Christians do themselves no favors when they politely avoid the topic. That is why Young and Stearley (2008, p. 464) have not finished the job when all they can say is: “We concur with Rudwick, Gould, and Austin that a sensible procedure in unraveling the geologic history of the earth is to apply known causes to past effects and phenomena before invoking hypothetical, unknown causes.”

Note that they classify God’s revealed work in history as “hypothetical” and “unknown,” in clear contradiction to the same historical text which justifies their uniformity of method. This kind of intellectual schizophrenia is to be expected from those with a religious commitment to Naturalism, but is surprising and disappointing from those who label themselves Christian. And the irony that instructors at *Calvin* College would thereby deny God’s providential role in history is stunning, to say the least.

Like every other Christian, Young and Stearley must reject uniformity of method as an absolute principle in the face of God’s primacy over nature and the *historical* evidence of God’s interaction on the stage of time. Enlightenment savants promoted “actualism” as an absolute method, keeping God at arm’s length in their pursuit of knowledge. But if God is sovereign over natural “processes,” including geological ones, then the Enlightenment dismissal of a divine role in history guarantees an invalid understanding of the past. Contrary to atheist accusations, God’s “interference” does not make Him a “cheater”—He clearly relates both His nature and His actions in the Bible. If people choose to ignore it as relevant evidence, that is not God’s fault.

But Young and Stearley do more than ignore the evidence; they compound their error by attempting to justify banishing God from geology. Wanting Christianity’s miracle-working God while also wanting to satisfy their secular peers, Young and Stearley make a curious compromise (2008, pp. 462–463):

We suggest, however, that God is economical with miracles and that he has employed them mainly in the service of redemptive history Arbitrary, unobserved miracles performed during the work of creation would have had absolutely no impact on people and would not serve to confirm the presence of God or the pronouncement of the word because no one was there to observe them Biblical miracles like the virgin birth, the resurrection or Jesus’ walking on water were powerful signs to the observers to confirm the divinity of Christ but such miracles have no bearing on the daily practice of scientific geology. Such miracles have no effect on historical reconstructions of the Earth’s past, nor do they affect the laws of physics or the course of chemical reactions What would be

a problem, however, is the introduction of arbitrary or capricious miracles with no compelling reason from the biblical text for assuming their existence. Assuming such miracles would make the pursuit of historical sciences more problematic.

Ignoring the ambiguity of the term “miracle” (especially *vis à vis* Providence), their attempt to fence origins and earth history from God’s rightful rule falls flat. In the first statement, their term “economical” is equivocal because it varies with the judgment of individuals. Do they mean one miracle or one hundred? Or do they refer to the scope of the allowable marvel? Second, since *all* of biblical history is redemptive history, their attempted partition between those parts of history with God and those parts without God creates an arbitrary division theologians do not recognize. Third, they fail to correctly assess the dual relationship between miracles and revelation. While they do note that miracles validate revelation as such, they miss the corollary: that revelation, even as merely an accurate historical record, validates miracles (Sproul, Gertsner, and Lindley 1984). Once the generally reliable historical record demonstrates the reality of miracles, it is in turn shown to be God’s revelation, which Christians are duty-bound to accept on God’s terms ... without picking and choosing ... and contrary to the excuse that superior truth is available through “general revelation.”

Other problems abound. They miss the true purpose of God’s work of Creation—to bring glory to Himself (Edwards 1754). That theme runs through the Bible in verses too numerous to cite. Second, they are clearly wrong in their rationale of people needed to see miracles to have an “impact” on them, because people do not have to *apprehend* an action to *comprehend* it through its effects (as David noted in Psalm 19 and Paul, in Romans 1), and thereby appreciate its greatness. Ironically, this type of causal reasoning is exactly how geologists purport to understand the unobserved past! We see the effects of God’s creation (for example, the anthropic principle) and marvel, even if we were not present when it was made. How else to explain Revelation 4:11, where people from every era *after the event* come together to praise God for His Creation. Furthermore, the miracles were observed. The Bible states that the angels sang at the Creation—they clearly saw God’s miracles (Job 38:7). Finally, Young and Stearley cannot deny the miracle of the Flood by this innovative filter—it was witnessed by Noah, his family, and by everyone who died. The “impact” on them would have been spectacular, though short-lived!

Geology cannot escape God because it is a human (created in God’s image) endeavor to understand nature (also created by God). Thinking that it can be fenced off by restricting miracles to the Incarnation,

Young and Stearley miss the reason for Christ's humiliation; namely original sin, which takes us right back to Adam, the Creation, and the first judgment of the Flood. They also ignore the fact that the same Christ who was attested to be the Son of God by the "redemptive history" miracles authoritatively confirmed the miraculous events of Creation and the Flood.

In their final statement, their use of "arbitrary" and "capricious" is troubling. Those words echo the taunts of Voltaire and his fellow Enlightenment skeptics who were antagonistic to the Christianity that Young and Stearley embrace. However, those terms, while typically used in a derogatory fashion, do catch the edge of a biblical truth. If God acts according to the council of His will in all His actions (including miracles), then I suppose that those acts might be termed "arbitrary and capricious." But by that standard, any act of God would have to be "arbitrary" and "capricious."

For my thoughts are not your thoughts, neither are your ways my ways, saith the LORD. For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts (Isaiah 55:8–9, King James Version).

But the Scholastic and Reformation theologians understood the nature of God better than their Enlightenment descendents, and were so able to drive a theologically-justified concept of uniformity as one of the foundations of modern science. What is curious is that those same Christians had no problem reconciling science with their faith—indeed, they believed that they could not have done science *without* their faith. Their opinion is borne out by the historical reality that: "As the historian Edward Grant explained, 'it is indisputable that modern science emerged in the seventeenth century in Western Europe and nowhere else'" (Stark 2003, p. 146).

Fortunately, we can solve the dilemma of Young and Stearley. There are two "compelling reasons from the biblical text" to reject their theology of miracles. First, both Old and New Testaments testify to the reality of Creation and the Flood. Second, that testimony must be true because it is "impossible for God to lie" (Hebrews 6:8, King James Version). It is worth noting that this stands in marked contrast to Romans 3:4 (King James Version) "let God be true, but every man a liar." Like the Enlightenment savants, Young and Stearley (2008) seem to have reversed the relative reliability of God and man.

Finally, recognizing God's hand in history does not make history or science "problematic;" it is quite the opposite. If the goal is truth, then knowing what actually happened is to be welcomed, not disdained. If there really was a global catastrophic flood, then consider the waste of time, money, and intellectual energy by all those who refuse to accept its clear

testimony from the biblical record. As Christians, Young and Stearley should prove jealous for God's glory in geology. Failing to acknowledge His works in history, and thus giving aid and comfort to those that openly deny Him seems much more "problematic" than believing Genesis.

3. *Uniformity of Rate*

The third "uniformity," or gradualism (Table 1), is what most people (including geologists) think of when they hear the word "uniformitarianism." That is because it is the longtime historical definition of the word, from Lyell up into the twentieth century. As late as 1990, Lemon, in his textbook of stratigraphy, (p.30) affirmed that "The uniformitarian view of earth history held that all geologic processes proceed continuously and at a very slow pace."

Even when modern geologists assert that neocatastrophism is a better paradigm for interpreting the rock record, we should remember that their educational background has drilled gradualism into their heads as the matrix within which secular catastrophes occur. That is why many geologists, even neocatastrophists, default to gradualistic interpretations unless the field evidence for catastrophism is overwhelming. In spite of the fact that recent decades have seen a plethora of once-gradualistic "processes" reinterpreted as catastrophic events, secular geologists and accommodationists seem highly confident in the gradualistic nature of remaining parts of the rock record.

But the logic of that position is weak. If phenomena that 50 years ago were considered evidence of gradualism are today considered evidence of catastrophism, then why should we not expect that trend to continue for the next 50 years? Or is the present "confidence" simply a means to bolster the geologic time scale in opposition to the Genesis Flood? No one can escape the undeniable role of diluvialists in spurring many of these changes in our understanding of the rock record—demonstrating in many instances that "evidences" of gradualism in the rock record are better explained by non-gradualistic processes (for example, Austin 1986; Oard and Reed 2009; Snelling 2008). All that is needed is the willingness to consider alternatives. Despite protestations of empirical, neutral, open-mindedness, secular geologists seem strangely unwilling to entertain the possibility of biblical truth.

Like many today, Gould (1984, p. 12) opposed this third uniformity, but missed the real issues when he stated: "Unlike the first two uniformities, gradualism is not a presupposition of method. It is a definite empirical claim about the world. It may be true or false. It must be tested, not assumed."

But how can an "empirical" claim be tested over

deep time? And if it is a statement about the duration of (unobserved) time, is it really an empirical claim? He probably erred in assuming “empirical” was a synonym for “science,” and in thus concluding that deep time is the domain of science. But “empirical” also applies to history and philosophy (Adler 1965). Tests of truth in science, history, and philosophy differ, so the “empirical claims” of gradualism may need to be tested by disciplines other than science. And since gradualism is a theory of the past, it seems reasonable that the tests needed to evaluate it would be *historical* empirical tests. Even if those tests drew inferences from forensic interpretation, they would still be historical tests and thus lack the certainty so desired by Lyell. That is because any evidence would be equivocal and subject to various speculative interpretations, as illustrated by a long history of geologists’ differing interpretations of the same phenomena. Since we cannot actually observe or experiment to prove or disprove the nature of any given unobserved unique past event, this attempt to imbue natural history with the certainty of science must be rejected (Reed 1999). That simple insight would have saved geology from 150 years of misdirected loyalty to gradualism.

That leads to a key question—another one not raised by Young and Stearley (2008). Why was gradualism so popular during the late eighteenth and early nineteenth centuries if it is so obviously wrong? Why did Lyell win and Cuvier lose? Why did Lyell’s vision of uniformity guide geology for 150 years? Even Gould (1984, p.27) recognized the importance of the question:

If gradualism stands up so poorly as a universal dogma when subjected to detailed examination, then why did it maintain its hegemony for so long? This question has no simple resolution, but I am certain of one thing: the popularity of gradualism did not arise from nature.

Gould, the Marxist, answered that question by reference to nineteenth century social conditions, not some scientific purity. Reed (1998) proposed a different answer; one that seems more in line with the Enlightenment struggle against Christianity. That proposal (which I still affirm) was that Lyell understood gradualism as a philosophy of history; he simply assumed that what was in reality history was instead “science.” In the context of his battle against Moses, Lyell understood the need for “science” to force a Christian retreat. Science is more readily applied across time when history is predictable. So his push for gradualism and a steady-state earth was based on a desire for Newtonian certainty, and he knew that catastrophism would degrade it. The consequent emphasis on processes rather than events further blurred the boundaries. Geology needed the

illusion of Newtonian certainty. Lyell’s heavy-handed gradualism seemed to provide it. Catastrophism—even that of Cuvier—would make prediction difficult, and emphasize the inexact historicity of geology rather than the iron certainty Lyell desired.

So while Young and Stearley (2008) go to great lengths to condemn creationists for equating uniformitarianism with gradualism, the shoe is actually on the other foot. Many of the older creationist references they cite merely mirror the contemporary opinions of geology as expressed in textbooks and technical publications. That is why Gould (1984) contradicts Young and Stearley, placing the blame squarely on the heads of professional geologists:

We are taught, in the conventional textbooks of geology, that Lyell routed a group of theological apologists and established geology as a modern science. This homily supposes that the catastrophists directly denied science by rejected the first two uniformities in favor of an earth ruled directly by a god who capriciously changed his own laws The textbook tale of uniformitarian goodies versus catastrophist baddies is a bit of self-serving, historically inaccurate rhetoric Lyell largely triumphed with his third uniformity of rate, while our current ideas on the history of earth and life lie closer to the directionalism of catastrophists than to Lyell’s steady state. Yet, modern geology bears Lyell’s name. We are all educated to call ourselves uniformitarians and to enshrine Lyell’s doctrine as “the greatest single contribution geologists have made to scientific thought” (Longwell and Flint 1955, p.385) [Gould 1984, pp. 13,14].

4. *Uniformity of Conditions*

The fourth uniformity (Table 1) is that of condition. In this instance, there is no directional history; the earth simply continues indefinitely in a steady state condition. Although this was the position of Hutton (Gould 1987; Rudwick 2005) and the initial position of Lyell, it was rejected almost as soon as it was proposed by most of their contemporaries, and abandoned by Lyell later in life to accommodate Darwinian evolution, with its linear, directional history.

This uniformity is fundamentally at odds with Western culture because it is fundamentally at odds with the Christian view of history:

The biblical view is that history had a beginning and will have an end, and that both the beginning and the end are in God’s hands. Therefore, what comes between them is invested with meaning and purpose; the creator is not the prime mover of ancient philosophy, and the terminator is not the bleak exhaustion of resources or the running down of the sun. Will and personality dominate everything and make of history a moral arena (Schlossberg 1983, pp.27–28).

Young and Stearley (2008, pp.467–468) agree wholeheartedly with Gould in dismissing this type of uniformity:

We reject, as most geologists have, Lyell's steady-state conception of Earth history. We are not uniformitarians in the sense that Lyell so strongly favored, because there is abundant evidence to indicate that there are directional characters to some aspects of the Earth's past. The fossil record documents a direction to the population of Earth from one-celled organisms to metazoans to vertebrates to mammals to human beings.

Their rejection of uniformity of state is admirable, as anyone who accepts linear, directional history will agree. However, there are two versions of linear, directional history available to choose from. One begins with God's creation of the cosmos; moves through His redemptive activities—which reach their apex at the Incarnation—and finally proceeds to the end of this present world, with judgment and cosmic renovation. The other version has no credible version of a beginning; asserts an evolutionary development of the cosmos, earth, and life ... all by chance, of course ... and presumes an end of life on earth with the far-away death of the sun. It offers no meaning, purpose, or eternal existence for mankind. Why Young and Stearley choose that version to refute steady-state uniformitarianism is strange to say the least. In affirming an evolutionary succession in the fossil record, Young and Stearley seem to be advocating directional evolution. But scientific (for example, Behe 1998, 2008), theological (Kulikovsky 2009; Mortenson and Ury 2008; Sarfati 2004), and moral considerations militate against this position. It is ironic that their advocacy of evolution follows their complaint that:

Like many other young-earth creationists, Morris frequently invoked an intimate connection between evolution and uniformitarianism as a strategy for discrediting the latter, given the widespread hostility toward evolution on the part of so many Christians in the evangelical wing of the church (Young and Stearley 2008, p.450).

Given their quote just cited, this statement appears to be self-refuting if an argument ... or perhaps it is simply a regret.

For Christians, the root issue is not geology, evolution, or any other cultural fad; it is the reliability of Scripture. Does God exist and has He revealed Himself in the Bible? Despite the exegetical gymnastics of theistic evolutionists, most Christians who are serious about Scripture recognize that the text cannot be twisted to accommodate the geological time scale and its evolutionary progression.

So far, the discussion has focused on the definitions presented by Young and Stearley (2008), who, in turn,

followed Hooykaas, Gould, Rudwick, and Austin in exploring the multitude of meanings of uniformity. As we have seen, they have affirmed the first two and denied the latter two. The timing of this development is of interest, and confirmation of their assertions from secular geologists both lead us to another source of information about uniformitarianism—the dictionary.

The Dictionary Definition

Geology was built on the foundation of Lyell's uniformitarianism. That truth is admitted with less pride than it was a few decades ago, but its historical veracity is unquestioned. The dramatic change in the fortunes of uniformitarianism over recent decades is mirrored by changes in its definition. This is of interest for: (1) the extent to which the fundamental principle of an established scientific discipline could evolve after nearly two centuries of practice, and (2) the institutional silence surrounding this revolution. Where is the outcry in the profession? Instead, all we see are the yawns of the rank and file professionals to whom this "fundamental principle" was so obviously unimportant to their work, and the furtive sighs of relief among the academics who through the wholesale conversion to secular neocatastrophism have managed to dodge biblical history once more.

As we have seen, Lyell's gradualism was unchallenged for nearly 150 years. In the 1960s and 1970s a few geologists and historians began reassessing the term and proposed the multiple definitions discussed above. For all practical purposes, secular geologists were able to keep the word and change the meaning—Ager (1973) could entitle a chapter "Catastrophic Uniformitarianism" with a straight face. It is interesting to track this transformation through the last three editions of the American Geological Institute's *Glossary of Geology*.

This analysis reveals that the gradualistic meaning of "uniformitarianism" remained entrenched in the geological lexicon well into the 1980s, affirming Lyell's imprecision in spite of growing evidence to the contrary. But as the work of the academics spread out into the discipline, things rapidly changed—perhaps the only real historical example of Gould's "Punctuated Equilibrium." Young and Stearley (2008) note that "most modern geologists" are neocatastrophists. The problem lies not with the truth of this statement (which creationists have not argued), but with: (1) why the previous generations were predominantly gradualists, (2) why it took so long to change, and (3) what the changes mean for the integrity of the discipline.

The work of Ager, Rudwick, Gould, and others is seen in the definition adopted by the Fifth Edition of the *Glossary of Geology* (Neuendorf, Mehl, and

Jackson 2005, p.697). Recall the four parts of “uniformitarianism” (Table 1) and the rejection of both gradualist and steady state meanings as you read this definition:

The assumption that “the geological forces of the past differ neither in kind nor in energy from those now in operation” (Hooykaas, 1963), which was the basis advocated by Charles Lyell for interpreting past phenomena by analogy with modern ones—thus the cliché, “the present is the key to the past.” The constraint of rate and intensity as well as of kinds of processes advocated by Lyell implied a vast extension of geologic time and earned the nickname *gradualism*. The terms “uniformitarianism” and its antonym “catastrophism” were coined by William Whewell in 1831 to express the divergent geologic systems of Lyell on the one hand and Cuvier and Élie de Beaumont on the other. Today, geology assumes only the uniformity of kinds and processes, so uniformitarianism should be used only in its historical context.

The timing and nature of the changes can be seen by comparing the definition above to those from the 1987 and 1997 editions of the *Glossary*. Bates and Jackson (1987, p. 713) defined uniformitarianism as:

(a) The fundamental principal or doctrine that geologic processes and natural laws now operating to modify the earth’s crust have acted in the same regular manner and with essentially the same intensity throughout geologic time, and that past geologic events can be explained by phenomena and forces observable today; the classical concept that “the present is the key to the past.” The doctrine does not imply that all change is at a uniform rate, and does not exclude minor local catastrophes. The term was originated by William Whewell to describe the basic approach to geology of Charles Lyell . . . (b) The logic and method by which geologists attempt to reconstruct

the past using the principles of uniformitarianism.

And Jackson (1997, p.691) defined it as:

The principal that “the geological forces of the past differ neither in kind nor in energy from those now in operation” (Hooykaas, 1963). It is essentially synonymous with the continental term *actualism*. By its emphasis on the cumulative effect of slow actions over protracted periods of time, uniformitarianism implied a vast extension of geologic time. Uniformitarianism and its antonym, *catastrophism*, are terms coined by William Whewell in 1831 to express the divergent geologic systems of (for example) Hutton and Lyell on the one hand and Cuvier and Élie de Beaumont on the other.

Clearly much changed. Table 3 shows how some of the more significant and diagnostic aspects of this evolution.

The essence of the change is shown in the red letter row at the bottom. Note how the 1987 definition clings to gradualism, while having to admit “minor” and “local” catastrophes. Of course this language is vague; there was no way to quantify either adjective, nor was it probably desirable, given the evidence that existed at the time for such global calamities as the extinction of the dinosaurs. The imprecision of Lyell was firmly entrenched, even then. But in the next edition, the gradualism was toned down to the quote from Hooykaas (1963) and the emphasis was on the “proof” of deep time by slow gradual processes, despite the warning of Shea (1982, p.457) that “The fallacy that uniformitarianism holds that Earth is very old is among the more widespread of the fallacies of uniformitarianism.”

This emphasis in the fourth edition is telling: geologists obviously felt a need to defend deep time in the face of a deteriorating foundation. There is only one intellectual trend which could have forced

Table 3. The evolution of uniformitarianism in the American Geological Institute’s *Glossary of Geology*: 1987 to 2005.

1987	1997	2005
The fundamental principle or doctrine	The principle	The assumption
geologic processes and natural laws	geologic forces	geologic forces
acted in the same regular manner and with essentially the same intensity through geologic time		only uniformity of kinds and processes recognized
	synonym of actualism	
past events explicable by forces and phenomena observed today		
“present is the key to the past” = classical concept		“present is the key to the past” = cliché
Whewell describing Lyell	Whewell describing divergent systems of (for example) Hutton and Lyell versus Cuvier and de Beaumont	Whewell describing divergent systems of Lyell versus Cuvier and de Beaumont
same manner at essentially the same intensity with minor local catastrophes	deep time implied by slow gradual cumulative processes	only uniformity of process

this concern—Flood geology. As is often the case, the breezy public dismissals of the possibility of a young earth covered a much greater professional unease. This is another reason to suspect that much of the revisionist work of the late 1960s and 1970s was driven in part by the increasing awareness and fear of creationism. By 2005, the fifth edition of the *Glossary* had caught up with the conclusions of the historians. Like Young and Stearley (2008), they note that geology has explicitly rejected the latter two definitions of rate and state.

However, it is interesting to see the schizophrenia in the editors, in choosing the quote of Hooykaas which was a definition of gradualistic uniformitarianism in its Lyellian sense, and was most definitely not a statement of “actualism” as Hooykaas understood it. Table 2 above shows those distinctions; therefore the *Glossary of Geology* contradicts itself in both 1997 and 2005 by asserting identity of geologic forces in both kind and energy, while simultaneously rejecting the third and fourth uniformities.

Several other changes leap off the page to illustrate the plummeting confidence of geology in its foundation. From 1987 to 1997 to 2005, uniformitarianism goes from “the fundamental principle or doctrine” of geology to simply “the principle” to finally “the assumption.” Note also the change in 1997 from “geologic processes and natural laws” to the more nebulous “geologic forces,” and note the change of the old motto “the present is the key to the past” from a “classical concept” in 1987 to a “cliché” in 2005. Although gradualism is still asserted (with qualification) in the 1987 assertion that geologic processes “acted in the same regular manner and with essentially the same intensity through geologic time,” it was abandoned somewhat obliquely by the misused quote from Hooykaas (1963), apparently using the citation to avoid making a direct statement by the editors. Those unfamiliar with Hooykaas’ may not understand his distinctions between the different uniformities and his predilection toward actualism as a method versus uniformitarianism as a system (see Table 2). It was not until 2005 that the clear rejection of gradualism and steady state uniformitarianism took place. The flirtation with “actualism” as a semantic replacement that has been popular among many geologists was attempted in 1997, but dropped later, perhaps because they recognized that it only added to the confusion.

Examination of these successive editions of the *Glossary of Geology* show that the leading edge work of the 1960s and 1970s was incorporated into the mainstream of geology over three decades. This has paralleled by a revival in interest in Cuvier by historians like Rudwick (1997). Historians of geology finally were able to overcome the propaganda of the nineteenth and early twentieth centuries

that pictured Lyell as the brave empiricist fighting the “evil” forces of fundamentalist Christianity, recognize the plethora of ideas about natural history contemporary with Lyell, and distinguish Cuvier and other secular catastrophists from the “Scriptural Geologists” (Mortenson 2004). Note the tentative acceptance by the 1997 edition of the new history with the teaming of Hutton and Lyell (dropped in 2005), and the use of the parenthesis “(for example)” in 1997 that disappeared in 2005.

In fits and starts, publications by geologists and historians, public opinion, and even the *Glossary of Geology* all seem to have reached agreement on a conceptual approach that divides uniformitarianism into four distinct meanings and discards two for contemporary use—including the gradualism that was the fundamental principle of geology for at least 150 years. There is one final semantic swamp to drain before we can move forward to greater conceptual and semantic clarity—the renewed interest in the old term “actualism.”

Uniformitarianism or Actualism

For more than a century, the British term “uniformitarianism” dominated geology. But in recent decades the older continental term “actualism” has made a comeback in geology. Unfortunately, the difference between the French origin and English translation has created some confusion.

Some authors have argued that actualism is a more appropriate term than uniformitarianism on the grounds that actualism refers to the *actual* or *real* processes of Earth history The problem here is that the term “actualism” in its geological context derives from the French term *actualisme* (Prevost, 1825), which in turn comes from the French *actuel*, which more appropriately translates as “contemporary: or “present day” than the English “actual” (Shea 1982, p. 456).

The confusion arose from more than vocabulary. The older concept of actualism referred to the method of limiting geological causes to those observed in the present:

“Actualisme” was propounded in France by Constant Prevost (1787–1856). Originally, in 1825...he courageously maintained against Cuvier that the present phenomena on earth, in the sea, and in the volcanos [sic] are produced by causes which do not essentially differ from those working in the past (Hooykaas 1963, p. 31, brackets added).

However, in Britain, uniformity was used by Lyell to describe both the method and the theoretical system whereby geologic causes remained invariable over time. As noted above, the confusion with uniformitarianism bled over into “actualism:”

The usual contradistinction of uniformitarianism or

actualism (by which a *method* as well as its resulting *system* was meant) and catastrophism (which is a geological *system* and not a method) has caused many misunderstandings (Hooykaas 1970, p.272).

With the modern shift away from gradualism and towards neocatastrophism, the connotations of “uniformitarianism” have made it a less popular term, with many geologists claiming that they are “actualists” and not “uniformitarians.” But that distinction does not stand up to closer scrutiny. Hooykaas noted as early as 1970 (p.271) that there was no real difference “In geological literature the ‘anglosaxon’ term ‘uniformitarianism’ and the continental term ‘actualism’ are generally used as perfectly synonymous...”

Shea (1982, p.456) noted the same thing:

In short, my survey of modern geological literature (including what I refer to as the definitive sources) reveals no consistent difference in meaning between uniformitarianism and actualism, and I consider them to be synonyms.... Sometimes this fallacy manifests itself when a modern author makes a point of describing his model of a geologic process as “actualistic”.... The text of such articles usually explains that “actualistic” processes or conditions are those that have modern analogs. However, as Gould (1965, p. 921) has pointed out, “actualistic” really means nothing but “scientific” and the adjective is, therefore, redundant in a scientific book or journal.

Therefore, it seems clear that employing multiple terms “uniformitarianism” and “actualism” for the same concept adds nothing to the debate, and only serves to confuse the issue. Although arguments

might be made over which word should remain, it is clear that it needs to be one or the other—since the concept is the same—and the other needs to be retired except for historical usage.

Streamlining the Terminology

Young and Stearley (2008) are content to simply point out the complexity of “uniformitarianism” in service of their thesis that creationists do not understand it. However, neither they, nor their secular predecessors have pushed the issue to its logical conclusion. Only a few, including Shea (1982, p.459), seem to understand that “The use of the term ‘uniformitarianism’ and all of its synonyms for some special content or assumption or methodology of geology should be abandoned as fallacious, fruitless, and confusing...”

Austin (1979, p.29) also saw the handwriting on the wall and recommended that “The term uniformitarianism, therefore, should be abandoned when describing formal assumptions used in modern geological inquiry.”

Both were prescient and correct in noting that where confusion exists, simplicity and clarity should be sought. Though at first glance, their proposal appears drastic, it is in large part the correct position. However, rather than dropping all the terms, we should seek clarity in whatever terms are *necessary* to further the debate. The discussion above suggests that this is not only possible, but desirable. A close examination of the meanings in Table 1 demonstrates that the term can be narrowed down to one particular meaning for contemporary

Table 4. Much of the confusion caused by the multiple meanings of the term “uniformitarianism” could be eliminated by reducing them from four to one. None of the changes violates historical precedent or common usage. The first step (top left) is to stop using it as a synonym for “uniformity,” since that term has a long history of clear use prior to the introduction of “uniformitarianism.” The next steps (top right and lower left) are to acknowledge the modern rejection of both substantive meanings. For historical usage, synonyms which capture clear meanings at that time can be substituted. For uniformity of rate, I suggest “gradualism,” since that is the common, well-established synonym, and for uniformity of conditions, I recommend “Huttonism,” since he was the first to seriously propose it for geology (Buffon’s 1749 theory was contradictory, with a catastrophic origin of the solar system). This leaves the single usage: “uniformity of process.”

<p>Methodological 1. Uniformity of law 2. Uniformity of process</p> <p>Substantive 3. Uniformity of rate 4. Uniformity of conditions</p>	<p>Call it “uniformity”. Both the concept and the term predated geology. It has a clear, unambiguous meaning.</p>	<p>Methodological 2. Uniformity of process</p> <p>Substantive 3. Uniformity of rate 4. Uniformity of conditions</p>	<p>Universally rejected by all of western culture, since it is essentially a denial of directional, linear history. Call it “Huttonism” since it was first advocated by James Hutton in 1785.</p>
<p>Methodological 2. Uniformity of process</p> <p>Substantive 3. Uniformity of rate</p>	<p>Traditional meaning for geology for around 150 years. Now rejected due to evidence in rock record of past catastrophes. Call it “gradualism” which is already an accepted term.</p>	<p>New definition of “uniformitarianism” 2. Uniformity of process “Actualism is prior; Uniformitarianism should be discarded</p>	<p>Term now means “The assumption that the past effects seen in the rock record will be interpreted by causes observed in the present unless otherwise demanded by the rocks.”</p>

Table 5. Of the original nine terms that were part of the confusion surrounding the term “uniformitarianism,” seven have been discarded or replaced, leaving two clear, unambiguous terms to move the debate forward.

1. Uniformity of law	replaced by prior term “uniformity”
2. Uniformity of process	replaced by prior term “actualism”
3. Uniformity of rate	replaced with synonym “gradualism” for the late Lyell
4. Uniformity of conditions	replaced with “Huttonism” for historical models of Hutton and early Lyell
5. Actualism	retained with original meaning of uniformity of process
6. Uniformity	retained with original meaning of invariant natural flow
7. Uniformity of nature	replaced by prior term “uniformity”
8. Methodological uniformitarianism	unnecessary and discarded
9. Substantive uniformitarianism	unnecessary and discarded

use. Two others of historical interest can be replaced by readily recognizable synonyms. The other can be discarded altogether (Table 4).

Gould (1965), Rudwick (1971), and Austin (1979) all followed the discussions by Hooykaas (1963, 1970) and agreed that the first meaning is identical with the prior and more general scientific principle of uniformity. Given that, why should we use “uniformitarianism” when the better and prior term “uniformity” is available? Its meaning was established long before the rise of modern geology, and in the interest of clarification, I propose that this meaning be stripped away from “uniformitarianism” and that when we intend to speak of “uniformity” that we simply use that well-established term. This will also correct Lyell’s original conflation of what Gould (1965) called “methodological” uniformitarianism and “substantive” uniformitarianism, which he labeled a “trick of rhetoric” (Gould 1987, p.119). There is no good reason to perpetuate Lyell’s imprecision and every reason to correct it.

This leaves three meanings. Two—uniformities of rate and conditions—are rejected by modern geologists, as noted by Young and Stearley (2008, p.468): “To sum up, neither we nor other modern geologists accept either the uniformity of geologic processes rates or the uniformity of geologic conditions through time.”

This is confirmed in the change that was seen in the 2005 edition of the *Glossary of Geology*, and so should be carried forward into the terminology. The one barrier to any change is the voluminous historical usage in the literature. However, since the *meaning* has changed, it seems only proper to follow with the *terminology*—for honesty’s sake, if nothing else.

The historical usage can be handled by readily recognized synonyms. I propose that “uniformity of rate” be called “gradualism,” since that is the most common synonym and is currently being used in the literature. It also has the benefit of clarity—every geologist knows what “gradualism” means.

Unfortunately, the final “uniformity of conditions” does not have such a readily-recognized synonym, probably because it was abandoned long ago. Its use in geology is archaic; according to Rudwick (2005) it was largely abandoned around the mid-nineteenth century. Since the first geologist to apply the theory in the context of modern geology was James Hutton, and since Lyell’s name is already closely associated with “gradualism,” I propose that the fourth uniformity be renamed “Huttonism.” In the context of his ahistorical system, the meaning should be quite clear to anyone with even a cursory knowledge of the history of geology.

That leaves one “uniformitarianism”—the uniformity of process. But there is another problem. Hooykaas (1970) and Rudwick (2005) both note the prior introduction of the term “actualism” in 1825, well before Whewell’s introduction of “uniformitarianism.” Though the latter is more prevalent in the current literature, the rules of priority should be observed. There is no need for two words with the same meaning, especially since both have a history of generating imprecision. Some might prefer to jettison “actualism” and keep “uniformitarianism,” but the former is the prior term and should be respected as such. The only requirement is that English-speaking geologists become aware of the different original meaning of the French “actualisme” as compared to the standard English usage.

Besides clarity, there are three added benefits to this proposal (Table 5):

1. The term “uniformitarianism,” which has contributed to so much confusion, can be dropped except in cases of historical reference.
2. The terminology of Gould (1965) can be jettisoned. There would be no further need to distinguish between “methodological” and “substantive” uniformitarianism. I suspect that Gould—no mean wordsmith—would be pleased to see such a helpful streamlining of geological terminology, were he alive today.
3. The usage of “uniformity” could be simplified

and clarified. The *Glossary of Geology* defines “uniformity” to include both of the first two meanings of “uniformitarianism.”

The principle of uniformity, which is the assumption of uniformity of *causes or processes* throughout time and space. “Amid all the revolutions of the globe the economy of Nature has been uniform and her laws are the only thing that has resisted the general movement” (John Playfair, 1802). Uniformity is a special geological case of the principle of parsimony or simplicity. Not synonymous with the uniformitarianism of Charles Lyell, who constrained throughout geologic time both the intensity and frequency and the kinds of processes seen today” (Neuendorf, Mehl, and Jackson 2005, p. 697, emphasis added).

Since only the latter should be equated with the proposed use of the term “actualism,” then “uniformity” can resume its rightful, prior, and more general scientific meaning, which the *Glossary of Geology* presently includes under “uniformity of nature”—generating more unneeded confusion:

The doctrine or principle of the invariability or regularity of nature, which holds that identical states or causes are followed by identical effects (p. 697).

Finally, this will alleviate Young and Stearley’s (2008) dilemma. If all earth scientists—diluvialists, secular geologists, and accommodationists—can agree on such an obvious simplification of the terminology, then the debate will automatically be simplified too. Everyone can move forward and engage in discussion on the one clear concept of actualism, without all of the historical mess associated with uniformitarianism—forever ridding ourselves of the Lyellian fog under which geology has labored since 1830. That alone should make the proposal attractive. If the debate is going to be between secular catastrophism with deep time and biblical catastrophism without it, then we can finally bury Lyell and move forward.

Why has this streamlining not been implemented? Austin (1979) and Shea (1982) both called for it. It seems logical. I suspect that one reason this eminently reasonable suggestion has not been implemented is a carryover from Lyell, who found that a nebulous definition worked in his favor. This was also the case on into the late twentieth century, when many geologists remained at least partially committed to gradualism. They may have found that the widening gap between their fundamental philosophy and empirical data favored the same luxury of equivocal use accorded to Lyell, but that is intellectually imprecise and not in the best service of the profession. It allowed the use of catastrophic explanation when necessary, but also allowed the default position of gradualism as an option. This confusion was evident in the 1987 definition in Bates and Jackson, which allowed “local minor catastrophes” as a part of its gradualism.

Fortunately, geology has moved forward. It can cement that progress by adopting new terminology to reflect it.

Problems to be Solved

No solution is perfect. Though this one helps clarify a confused situation, there are still several problems that need to be discussed regarding the new concept of “actualism.” I will mention three, noting that Hooykaas (1970, p. 275) discussed them first:

The above classification does not cover all differences of system and method and interpretation in geology. How far can we go back into the past in order to be able to speak of uniformity of the situation, or—less stringently—, of the applicability of “actual causes” in the explanation thereof? How long ought to be the period of change one takes into account for deciding whether a change is catastrophic or continuous? Moreover, as to the identity of kind or the identity of energy of geological causes, a wide range of interpretation seems to be possible. It is difficult to establish what is meant by geological causes in contradistinction to physical causes. A good deal of confusion may arise through the ambiguity of the term “actual cause.”

The first problem is the ambiguity of the term “present.” What period of time is encompassed? It seems at the very least that it must be restricted to periods when reasonable scientific observation and description are available, but that is an arbitrary and subjective limit, based on pragmatic necessity, not logical criteria that are determinative of geological processes. Furthermore, that time changes depending on where the observations were taking place. Reliable documentation of processes in Western Europe may date back into the seventeenth century, while knowledge of the Polar Regions or the deep oceans are still quite limited. That is one reason that the small caveat noted by Hooykaas (1970, p. 315) should be observed, that “*Actualism*, on the other hand, covers a wide range of theories...that go together with the methodological principle of being as ‘actualistic’ as the geological facts admit...”

This is similar to Austin’s (1979, p. 39) emphasis on the rock record rather than a priori systems of interpretation. He recognized that interpretation was complicated by:

... unusual ancient processes, undiscovered processes, and inversions of actualistic reasoning as important problems for causal uniformitarianism. The geologist’s technique in deciphering ancient processes, they affirm, relies not only on analogies with products of modern geological processes, but on analogies with products of similar ancient processes, on analogies with products from experimental replicas and other non-geological systems, and on logical deductions from theories or scientific laws. Proper

interpretations of ancient processes should, they say, involve complex techniques of inference, not just simple one-to-one association of products of modern and ancient processes. By using complex inference techniques, the geologist retains the maximum flexibility when confronted with anomalous facts, the proper perception of which is probably the crucial step in the act of scientific discovery.

This is a more reasonable approach to geohistory, and one that de-emphasizes the dogmatism that has encumbered the discipline for so many years. Catastrophists and gradualists could work well together if both respected the non-absolute nature of historical interpretation.

The second ambiguity is in defining a “geological cause.” Historically, imprecision in this concept has forced geologists over and over again back to physical and chemical laws, yet these are not specifically determinative of geological events. Simpson (1963) struggled with relating “immanent” physical laws to geological “configurations” of earth’s past. It may be that geological causes will always have a degree of imprecision and resulting uncertainty, but attempting to constrain them more completely is a goal that today’s neocatastrophists should embrace.

Ironically, Baker (1998) urged a reverse concept; learning from the rocks. He advocated a non-actualistic approach, where reasonable hypotheses would develop from a systematic study of the ancient rock record, rather than the attempt to impose modern environments and causes onto the rocks. In today’s heady revolutions in the earth sciences, that is certainly a methodological proposal that bears closer scrutiny.

The third problem is a corollary of defining geological causes. The problem is that introduced by scale. When does a quantitative change in rate or intensity of a particular geological cause create a qualitative change in the geologic process itself? Gradualists never had to face this uncomfortable question, but if today’s geologists are set on neocatastrophism, then they must address it head on.

Conclusions

This article and those that follow in this series grew out of a response to Davis Young and Ralph Stearley (2008) and their mischaracterization of diluvialists regarding uniformitarianism. If nothing else, it demonstrates that their basic thesis—diluvialists argue to a straw man because they don’t realize that neocatastrophism has resolved the dichotomy between “uniformitarianism” and “catastrophism”—is incorrect. Diluvialists are aware of the nuances of the terminology (for example, Austin 1979; Reed 1998). Ironically, the “false dichotomy” that Young and Stearley wish to place on the backs of diluvialists

actually stems from confusion and deceit on the part of secular geologists—from Lyell’s “rhetorical trick” of conflating uniformities to the “empiricist myth” of his followers, that lasted well through the twentieth century. This confusion in terminology has been readily admitted by everyone from S.J. Gould (1987) to M.J.S. Rudwick (2005), but was apparently missed by Young and Stearley.

Furthermore, instead of being content merely to discuss the problem, I have proposed a solution, which if adopted, would clarify the entire debate about the nature of geological history. Since all four of the meanings of “uniformitarianism” are covered by prior terms or are obsolete, then the elimination of the word and its inherent confusion would benefit all earth scientists. Historians of science desiring to discuss the systems of Hutton and the early Lyell can refer to “Huttonism,” and those desiring to discuss the system of the later Lyell and the Neo-Darwinian synthesis, can refer to “gradualism.” The terms “uniformity” and “actualism” can revert to their original uses, and a real discussion about method can be joined that will focus on how uniformity and actualism can be justified in the context of either Christianity or Naturalism. Furthermore, much associated verbiage that has been created to support the tottering house of cards represented by Lyellian geology can be swept onto the dustbin of history.

Finally, if secular geologists wish to adopt neocatastrophism, then uniformitarian arguments against Flood geology must be abandoned, and consistency encouraged on the part of all parties. If the geological record is to truly be analogous to Ager’s life of a soldier, then the implications of that history must be considered. Among these are the loss of vast eons of “evidence” that upheld the geological column for 150 years. As true empiricists, secular geologists must be willing to admit that their “record” of the past is but a few grains of sand on the beach of time:

The geological record, though varied and extensive, is, even at its best, a poor sample of geological time. Most of the record is of major but short-lived events, such as volcanic eruptions or turbidity currents. Even in the best parts of the record, for example in slowly deposited sediments, the time captured in the rock is only a small sample. In the history of tectonic or metamorphic events, only peak events are usually well recorded, and the intervening periods, when significant but less events may have been frequent, may not be recorded at all. The record is thus a partial and biased sample of geological time; worse, we do not know what we miss. From this is reconstructed the history of our planet (Nisbet and Rose 2000, p.417).

Furthermore, it is all well and good for Young and Stearley (2008) and their secular colleagues to

announce that they, as neocatastrophists, are right when many generations of their predecessors were not. But only the credulous could believe that all those past geologists—who defended gradualism as pure science—were fools or knaves. That would amount to C.S. Lewis’ “chronological snobbery.” Wiser heads might consider that if one group of geologists over 150 years can be wrong (or even worse, blinded by bias) that current members of the same profession might be susceptible to similar problems. And if so, might the problem not rest in assumptions and methods that underlie geology? Also, where are the apologies to Scriptural Geologists who pointed out the errors of the gradualists in the nineteenth century? Or the early diluvialists who were told in no uncertain terms that *gradualistic* uniformitarianism disproved the Flood? The jump to neocatastrophism may have helped accommodate the clear evidence of the rock record, but it certainly has done little for the credibility of geology as a profession, and secular geologists would be remiss not to address this issue.

Bearing all that in mind, a little more humility in historical reconstruction should be expected *vis à vis* Flood geology. After all, diluvialists have two things going for them the secular geologists to not: (1) a consistent record of advocating catastrophism, and (2) an external historical record to bolster the empirical data that now appear less than self-evident. Other problems exist with neocatastrophism, but will be addressed in future segments of this series.

Suffice it to say for now that Young and Stearley’s (2008) confidence in neocatastrophism is misplaced, inasmuch as they believe that it resolves the “false dichotomy” of diluvialists between uniformitarianism-as-gradualism and catastrophism. That is because they fail to recognize the *real* distinction between Christian and secular geologists for over two hundred years—the affirmation/denial of the Flood, not the tempo and mode of a prehistory that the Bible does not even recognize (fig. 2). Although diluvialists welcome the recognition that the rock record’s documentation of past catastrophes (a point they have been making since before Lyell), that has only been the main point of contention in the minds of secular polemicists,

especially those followers of Lyell who wished to smear Cuvier and his followers as biblical literalists. As Fig. 2 demonstrates, the distinction between catastrophism and gradualism does not necessitate consideration of the biblical record one way or the other, because that distinction is a sliding scale that can rest solely on empirical observation. It is only when the true dichotomy between the reality and the non-reality of biblical history is considered, that the differences between all three perspectives can be truly appreciated and debated as such.

Having clarified the terms and concepts surrounding the basis for geohistorical interpretation within the narrow confines of scientific methodology, we can move forward to address the true differences between diluvialists, secular geologists, and accommodationists. In other words, this paper has only clarified the confused terminology; the underlying concepts must now be evaluated in their own right. There is no guarantee that diluvialists and secular catastrophists can agree on the concepts, even if they agree on the definitions of the words. In fact, there is every reason to believe that they will not. That is because examining and justifying assumptions and methods requires us to look outside science. This might prove a difficult step for advocates of Naturalism, because they have been trained to disbelieve the existence of first-order philosophy and accept first-order philosophical statements as conclusions of science. Yet a true understanding of why uniformitarianism in its various historical incarnations was an offense to Christians requires a step outside of Enlightenment positivism and into the intellectual universe where theology, philosophy, and history are all (to some degree) empirical pursuits, and where the truth value of their conclusions can stand on the same plane as those of science. Resistance to that proposal is not science or common sense, it is merely secular dogmatism. Those who are willing to consider these topics with an open mind are welcome to explore the possibility that uniformitarianism functioned in the past as something other than the method of geology, which is the topic of the next paper in this series.

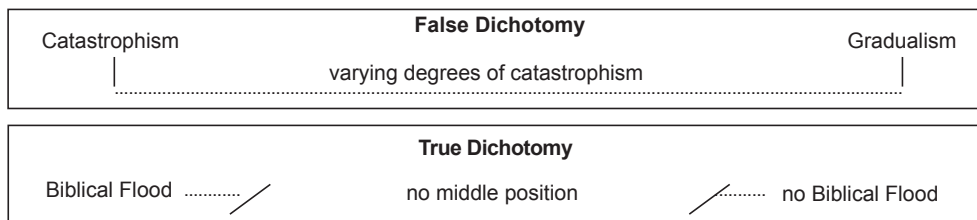


Fig. 2. Setting the conflict as being between catastrophism and gradualism misses the point. Clearly there is a spectrum along which belief can move unimpeded between the one and the other, since gradualism is no catastrophism, but things can change incrementally, moving all the way over to all processes being catastrophic. The true conflict is the affirmation or denial of the biblical Flood, positions that have no mediating positions.

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