Chapter 2

Uniformitarian Geology Cannot Explain Most Landforms

Early geomorphologists expected great progress in their science, thanks to the uniformitarian principle. The "superstition" of the biblical record had finally been expunged (they thought) from science, and optimism was running high. William Morris Davis, one of the great pioneers in geomorphology, stated:

> It cannot be doubted in view of what has already been learned today [sic], that an essentially explanatory treatment must in the next century [20th century] be generally adopted in all branches of geographical study…[1]

But a funny thing happened on the way to this secular utopia. Dedication to uniformitarianism provided no automatic answers to the origin of landforms. At first, it was thought that a few more years of research would provide answers, but as time went by, geomorphologists were left with little but mysteries. Hypothesis after hypothesis was advanced, but none were able to explain the field data. Hypotheses went through predictable cycles of euphoric popularity, failure, and dismissal.

One of the most famous of these failed theories was the "cycle of erosion" developed by William Morris Davis about 1900. It was popular for about 60 years but has since been discarded.[2] More information on this theory will be presented in Volume II.

Many Ideas, No Viable Solutions

Mainstream geologists do not lack ideas that attempt to explain the origin of landforms. There are typically several hypotheses for every mysterious landform. It cannot be emphasized enough that the principle of uniformitarianism is the dominant assumption behind them all. It acts as an unseen constraint, like a mental straightjacket. Canadian geomorphologist, C.H. Crickmay, stated that uniformitarianism is a fundamental tenet of geomorphology:

> In all the hypothetical systems of geomorphic evolution, there are two well and widely trusted assumptions: (1) that the distribution of geological forces and energy is consistent and uninterrupted; (2) which is a consequence of 1, that *all existing geomorphology [sic] is now, as always, being moulded by processes currently in action* (emphasis mine).[3]

In other words, Crickmay assumes that present processes of sediment erosion, transport, and deposition, acting over millions of years, can explain all the geological and geomorphological features on Earth. The rock record bears proof of ancient catastrophes, but these are minimized and not allowed to change the basic belief in uniformitarianism. But all attempts to explain landforms using the principle of uniformitarianism have ultimately failed. Crickmay goes on to say:

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[1] Davis, W.M., 1954. *Geographical Essays* (D.Q. Johnson, editor), Dover Publications, Mineola, NY, p. 272.

[2] Summerfield, M.A. 1991. *Global Geomorphology*, Longman Scientific & Technical, New York, NY.

[3] Crickmay, C.H., 1974. *The Work of the River: A Critical Study of the Central Aspects of Geomorphology*, American Elsevier Publishing Co., New York, NY, p. 195.

> A century and a half of literature bearing on scenery and its meaning shows primarily the inspired innovations that carried understanding forward; followed in every case by diversion from sound thinking into inaccuracy and error.[4]

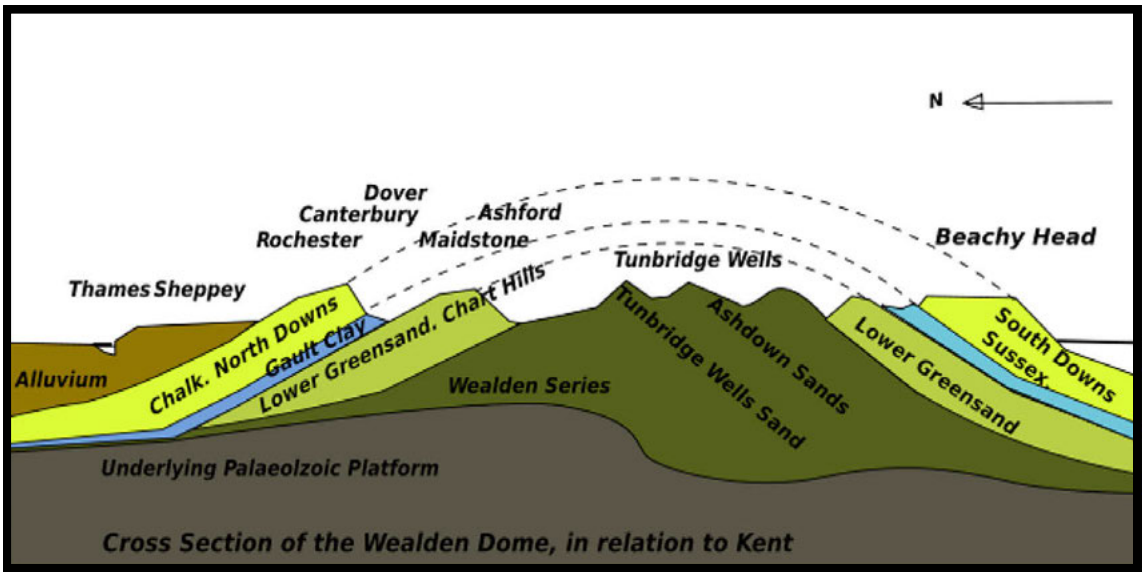

Figure 2.1. Uplifted, eroded Wealden Dome of southeast England (from Wikipedia). Total erosion in the center of the dome is about 1 mile (1,600 m).

In every case, these hypotheses were rejected. Crickmay is amazed that after all these years landforms still remain unexplained:

> The difficulty that now confronts the student [anyone who studies landforms] is that, though there are plenty of hypotheses of geomorphic evolution, there is not one that would not be rejected by any majority vote for all competent minds. This situation is in itself remarkable in a respectable department of science in the latter half of the 20th Century.[5]

Crickmay is not alone in stating the dismal results of geomorphology: "…it became increasingly evident after 1960 that *no* satisfactory understanding of geomorphological processes existed… (emphasis mine)"[6] In light of the proud assertion that it would be easy to explain landforms once the Genesis Flood was rejected, it is now evident that all uniformitarian scientists have done is to exhaust themselves trying. From the standpoint of the history of science, this is an amazing story. If modern scientists were really as "open-minded" as they like to portray themselves, they would have long since questioned their fundamental belief in uniformitarianism and their automatic rejection of biblical history.

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[4] Crickmay, Ref. 3, p. 201.

[5] Crickmay, Ref. 3, p. 192.

[6] Green, C.P., 1980. The shape of the future. In, Jones, D.K.C. (editor), *The Shaping of Southern England*, Institute of British Geographers Special Publication No. 11, Academic Press, New York, NY, p. 252.

Figure 2.2. Inspiration Point in Bryce Canyon National Park showing post-Flood weathering (photo by Tom Vail).

Geomorphologists Have Given Up Trying to Explain Landforms

Geomorphologists have had so much trouble coming up with viable hypotheses for the origin of practically all significant landforms that they have essentially given up trying to explain their origin since the 1960s and 1970s.[7,8] The field of geomorphology is in such disarray that after 200 years, scientists cannot even provide a credible hypothesis for the geomorphology of southeastern England—an area studied very early in the development of the science of geomorphology.[9] Figure 2.1 shows that about 1 mile (1,600 m) of erosion occurred in southeast England resulting in several unexplained geomorphological features, such as water and wind gaps (see Volume III). Due to these failures, geomorphologists have restricted their studies to *small-scale* processes observed today, such as weathering (Figure 2.2), landslides (Figure 2.3), and river erosion (Figure 2.4). Twidale noted that "The origin of most landforms remains more or less controversial."[10]

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[7] Smith, B.J., W.B. Whalley, P.A. Warke, and A. Ruffell, 1999. Introduction and background: interpretations of landscape change. In, Smith, B.J., W.B. Whalley, and P.A. Warke, (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society Special Publication No. 162, The Geological Society, London, U. K., pp. vii–x.

[8] Summerfield, M.A., 2000. Geomorphology and global tectonics: introduction. In, Summerfield, M.A. (editor), *Geomorphology and Global Tectonics*, John Wiley & Sons, New York, NY, pp. 3–12.

[9] Jones, D.K.C., 1999. On the uplift and denudation of the Weald. In, Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of London Special Publication No. 162, The Geological Society, London, U. K., pp. 25–41.

[10] Twidale, C.R., 2003. Canons revisited and reviewed: Lester King's views of landscape evolution considered 50 years later. *GSA Bulletin* 115:1,165.

Figure 2.3. Gros Ventre landslide scar (arrow) at the eastern edge of Jackson Hole, Wyoming.

Note how the assumptions of geomorphology have led to a dead end. Since the theories of landform origins have proven unworkable, the only possible conclusions are that there is a deficiency in our knowledge of present processes or that the assumption of uniformitarianism is wrong. Unable to face the latter possibility, geomorphologists pursue the former, hoping against hope that a better understanding of present processes, will someday unlock the mysteries of the past. This modern emphasis on present processes is called *process geomorphology*, which focuses on small timeframes and areas, while ignoring the origin of landforms altogether.[11] However, some mainstream geologists are hoping that a study of tectonics, horizontal and/or vertical earth movements, will enliven "…long-standing problems of landscape evolution and rates of landscape largely ignored in the preceding decades."[12]

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[11] Summerfield, Ref. 8, p. 3.

[12] Summerfield, M.A., 2000. Preface. In, Summerfield, M.A. (editor), *Geomorphology and Global Tectonics*, John Wiley & Sons, New York, NY, p. xv.

Figure 2.4. River deposition by the braided Toutle River, Washington, after erosion and transport.

There is nothing wrong with process geomorphology; in fact, it would have been a more fruitful study early on, providing a better observational basis for geomorphology. Battiau-Queney wrote:

> It is true to say that long-term landform evolution has been much neglected since the 1970s and that simultaneously the study of processes has become pre-eminent. One reason is probably that most classical landscape models which were proposed at this time were incompatible with the plate tectonics theory that was being introduced into the Earth sciences including the concept of the cycle of erosion and the idea that long-term evolution is time-dependent and leads to planation.[13] But contrary to expectations, the theory of plate tectonics has had *little* impact on an understanding of geomorphology.[11]

It is interesting that uniformitarian scientists study present processes in the hope of explaining past features, but it is becoming obvious that they do not yet even understand present processes. Hundreds of articles are published every year in the geomorphological journals trying to learn more about present processes. If they do not understand the present well, then how can they be confident they understand features formed in the past? But in spite of the benefits of this new approach of focusing in on process geomorphology, it also has some drawbacks. One is the refusal to acknowledge that present day processes do

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[13] Battiau-Queney, Y., 1999. Crustal anisotropy and differential uplift: their role in long-term landform development. In, Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of London Special Publication No. 162, The Geological Society, London, U. K., p. 65.

not explain many landforms; instead, they appear to be destroying them. Modern erosion dissects planation surfaces; it does not form new planation surfaces (see Volume II). So, the basic problem of finding the origin of landforms lies elsewhere than in present processes; the problem goes back to basic assumptions.

The Problem is the Paradigms

Why is it so hard to explain landforms? Clearly there has been no shortage of effort, money, or time. Landforms and the processes acting on them are easily observed. One potential reason may be the unquestioned assumptions of geomorphology, in particular the stubborn adherence to the paradigms of uniformitarianism and deep time. It would be most unscientific not to assess the assumptions. After all, science is about weighing different theories objectively.

It is encouraging that secular thinkers are now seeing the need to challenge some of the old assumptions. Slaymaker stated after a conference:

> As I came away from the crowded lecture theatre I overheard many heated conversations. One said "I hope they never try making a silk purse out of a sow's ear again" and another said "Just what geomorphology needs—a re-examination of our fundamental premises."[14]

Bremer summarized the debate: "We need theories, paradigms and systems, and constructive debate about them."[15]

Although the participants in the conference recognized the need for new thinking, practically all would still refuse to challenge the root of the problem, their paradigms of uniformitarianism and deep time. As long as they try to explain landforms in terms of present rates of weathering, erosion, and other processes, they will never be able to derive compelling theories of landform formation. One would think that 200 years of fruitless research would lead them to abandon that paradigm. Some stray near the truth, such as Smith and others, who admit that uniformitarianism does not work:

> There is, however, an increasing awareness that such extrapolation [from the small to large scale] is essential and that present-day landscapes cannot be explained *solely in terms of current processes or even those that operated in the geologically recent past* (brackets and emphasis mine).[16]

These are helpful steps towards geomorphologists starting to think outside the box. But that box is hard to escape, and anyone who does stray faces the anger of the scientific establishment. Even so, many geomorphologists admit that practically all landforms were formed in the past by some unknown process or processes and not a result of present processes.[17] Green asserts:

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[14] Slaymaker, O., 1996. Introduction and context: Denys Brunsden's tablets of stone. In, McCann, S.B. and D.C. Ford (editors), *Geomorphology Sans Frontières*, John Wiley & Sons, New York, NY, p. 33.

[15] Bremer, H., 1996. Climatic, climatogenetic and tectonic geomorphology, the great debate: Denys Brunsden's tablets of stone. In, McCann, S.B. and D.C. Ford (editors), *Geomorphology Sans Frontières*, John Wiley & Sons, New York, NY, p. 39.

[16] Smith *et al.*, Ref. 7, p. viii.

[17] Bremer, H., 1996. Climatic, climatogenetic and tectonic geomorphology, the great debate: Denys Brunsden's tablets of stone. In, McCann, S. B. and D. C. Ford (editors), *Geomorphology Sans Frontières*, John Wiley & Sons, New York, NY, pp. 34–39.

> The most far-reaching implication arises from the recognition that almost all landforms are relics and have not been shaped only, or even largely, by present-day processes. In other words, a powerful variable in the present-day geomorphological system is the relief inherited from the past and often shaped in environmental conditions very different from those of the present.[18]

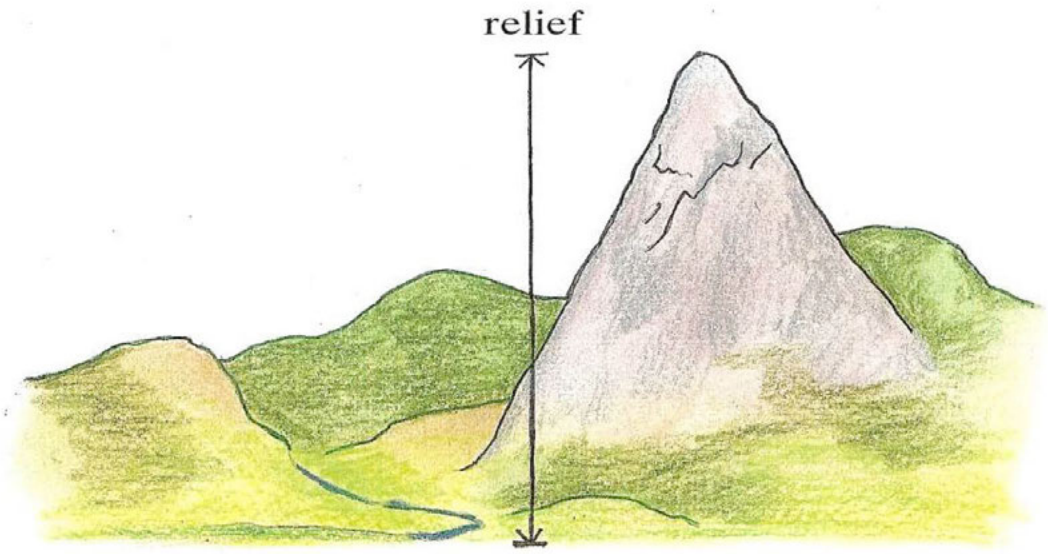

Figure 2.5. The distance between the highest and lowest point in an area is the relief. In mountainous areas relief is high while on planation surfaces it is very low (drawn by Mrs. Melanie Richard).

Relief is the difference between the high and low points in the terrain (Figure 2.5). For many years, scientists thought that enough time would automatically explain the mysterious landforms observed. But the paradigm of deep time does not work. Green further noted that the timescale was of little help in geomorphology:

> Measured erosion rates…suggest that present-day processes, if sustained in the past could have created the present relief of Britain in, at most, a few million years, and over the full span of the Cenozoic [65 million years] could have reduced the whole landmass of Britain much closer to base-level [sea level] than it is. Nevertheless landforms apparently of early Tertiary age [about 55 million years ago] are present even in the landscape of lowland Britain at levels far above present base-level.[19]

Base level is the theoretical lowest level toward which erosion constantly progresses but seldom, if ever, reaches. It is also defined as the level below which a stream cannot erode its bed. Sea level is the ultimate base level but temporary base levels may exist at higher elevations (Figure 2.6).

The quote above by Green not only indicates that most landforms are not formed by present processes, but also hints that the assumed dates of the landforms (based on the

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[18] Green, Ref. 6, p. 255.
[19] Green, Ref. 6, p. 255.

timescale) are too old. This is a serious problem for geomorphology; many landforms are dated at tens of millions of years old, but current erosion rates would completely level them in a much shorter time, suggesting that the old dates are incorrect.[20] More information on such supposedly old landforms will be presented in Volume II.

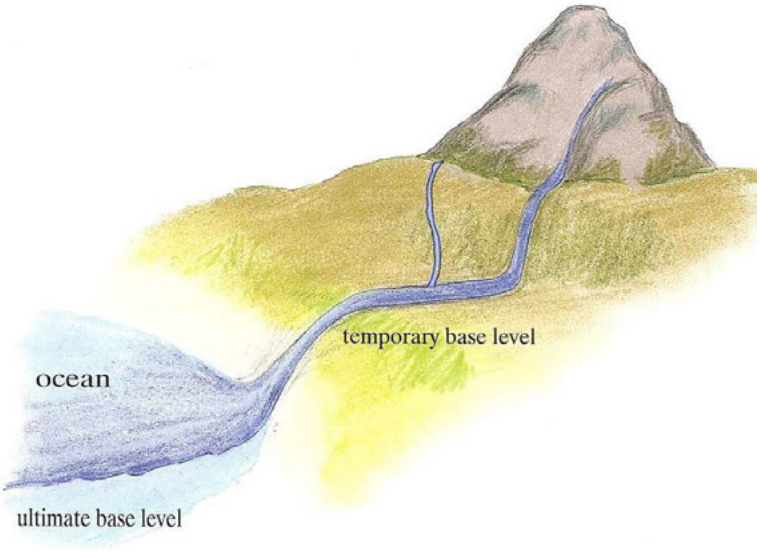

Figure 2.6. Schematic illustration of ultimate base level (sea level) and a temporary base level (drawn by Mrs. Melanie Richard).

Landforms Formed by Water

Another fundamental principle of geomorphology is that almost all existing landforms have been formed by water: "Water is the critical factor in landform evolution on Earth."[21] In fact, Crickmay titled his major work on geomorphology, *The Work of the River*.[22] Geomorphologists Twidale and Campbell corroborate Crickmay's deduction: "Third, water and rivers are the dominant forces responsible for shaping extensive areas of the continents."[23] Other process, such as weathering and mass flow (downslope spread of sediment or rock, see Appendix 10) contribute to erosion, but even then water is involved, and weathered materials are usually carried away by streams and rivers.

Since water is essential and since modern processes do not explain landforms, we must logically consider *some watery process that is not operating in the present* to account for landforms. Was there such an event in history? Yes there is in biblical earth history.

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[20] Oard, M.J., 2000. Antiquity of landforms: objective evidence that dating methods are wrong. *Journal of Creation* 14(1):35–39.

[21] Twidale, C. R., 1996. Exception probat regulam: do exceptional forms test general theories? In, McCann, S. B. and D. C. Ford (editors), *Geomorphology Sans Frontières*, John Wiley & Sons, New York, NY, pp. 40–52.

[22] Crickmay, C.H., 1974. *The Work of the River: A Critical Study of the Central Aspects of Geomorphology*, American Elsevier Publishing Co., New York, NY.

[23] Twidale, C.R. and E.M. Campbell, 2005. *Australian Landforms: Understanding a Low, Flat, Arid and Old Landscape*, Rosenberg Publishing PTY Ltd, Dural Delivery Centre, New South Wales, p. 207.

The Call for an Outrageous Hypothesis

As indicated above, some geomorphologists are calling for a bold, new synthesis because landforms are not being explained by present processes, despite a mass of new information:

> …a bewildering mass of information requiring systematization and synthesis. The time is ripe for bold judgments [sic]—by minds well steeped in the information and seeking coordination of data from place to place and discipline to discipline."[24]

Baker, recognizing the failures of conventional geomorphology, thinks an *outrageous hypothesis* is needed.[25] The idea of an "outrageous hypothesis" dates back to the Lake Missoula flood controversy caused by the research of J Harlen Bretz in the 1920s.[26] The Lake Missoula flood was the "outrageous hypothesis" that was finally accepted 40 years later. Baker and Twidale also write:

> Much of modern Geomorphology lacks the enchantment that the science possessed a century ago. Practical and philosophical impediments are thwarting modern attempts to achieve a satisfying understanding of landforms and their genesis…
>
> Hope for the reenchantment of Geomorphology lies in a new connectedness to nature that will facilitate the identification of anomalies and the formulation of outrageous hypotheses of causation.[27]

So, a few geomorphologists are looking toward an "outrageous hypothesis" to save their discipline. However, King, Baker, and Twidale penned these words from 1983 to 1991, and it has been business as usual in geomorphology ever since. Although they need an "outrageous hypothesis," nothing has changed.

This book offers an "outrageous hypothesis" that will not only reinvigorate geomorphology, but will explain many of geomorphology's mysteries. It recognizes the role of water and the role of unusual past processes, operating at a much larger scale than those observed in the present. This "outrageous hypothesis" is that the paradigm of uniformitarianism and deep time be replaced by the framework of biblical earth history, including the Genesis Flood.

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[24] King, L C., 1983. *Wandering Continents and Spreading Sea Floors on an Expanding Earth*, John Wiley and Sons, New York, NY, p. 216.

[25] Baker, V.R., 1988. Geological fluvial geomorphology. *GSA Bulletin* 100:1,157–1,167.

[26] Oard, M. J., 2004, *The Missoula Flood Controversy and the Genesis Flood*, Creation Research Society Books, Chino Valley, AZ.

[27] Baker, V.R. and C.R. Twidale, 1991. The reenchantment of geomorphology. *Geomorphology* 4:73.