The paradox of Pacific guyots and a possible solution for the thick 'reefal' limestone on Eniwetok Island

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Guyots are flat-topped seamounts. Thousands of guyots, often in chains and clusters, are strewn across the Western Pacific Ocean, especially between the Hawaiian Islands and Japan. The guyots in the Mid-Pacific Mountains are particularly numerous.[1] The tops of the guyots are generally about 1,500 meters below sea level. Guyots present a number of persistent problems within the uniformitarian paradigm:

> *'Since Hess first recognized them in 1946, the origin of flat-topped seamounts, or guyots, has remained one of the most persistent problems in marine geology.'*[2]

Several of these paradoxes were discussed in a recent article in *Nature?*

Scientists have presumed that guyots are erosionally-truncated drowned volcanoes. However, many North Pacific guyots are actually large volcanic platforms capped by thick carbonate, and topped by a veneer of pelagic ooze.[4] Uniformitarian scientists believe the carbonate represents ancient reefs that drowned. This belief is reinforced by ocean drilling program (ODP) drill cores that contain fossils of rudists,[5] corals, calcareous algae, and benthic foraminifera. Since guyots are assumed to have formed at sea level, the main paradox facing uniformitarian scientists is that reef growth should have been one to two orders of magnitude faster than relative sea level rise.[4] Many modern reefs have survived through ice age fluctuations of sea level and a large Holocene transgression.[6] In other words, the ancient reefs should not have drowned.

Two hypotheses are presented to explain guyots in the *Nature* article, each with its problems. The 'death-by-emergence-and-submergence' hypothesis postulates regional tectonic and eustatic (sea level) changes that caused a temporary emergence of the reef followed by a rapid relative rise in sea level to drown the reef. The idea of emergence is based on the likely development of holes and caves (karstification) in the limestone cap, based on sink holes and dolines,[7] discovered on many guyots.[8] It is this karst topography that supposedly is evidence of emergence, and when sea level rose again, the karst topography retarded the building of the reef, which therefore aided reef drowning. The second 'death-in-the-tropics,' hypothesis suggests that the reefs drowned while the guyots, which formed in the Southern Hemisphere, passed northward across the equator on the moving Pacific plate. The main problem with this hypothesis is that the equatorial belt is currently a zone of high reef growth. Consequently those who hold this hypothesis must postulate some equatorial reef-retarding mechanism, the opposite of today.

A big problem for both hypotheses is that in the Marshall Islands guyots are near surviving atolls, for example Enewetok and Bikinni islands that have thick carbonate caps (Figure l).[9] An atoll is a generally circular reef surrounding a central lagoon. Wilson *et al.* state that both hypotheses for the drowning of guyots are problematic: *Nevertheless, the mechanism responsible for drowning remains poorly constrained.'* [9] Based on isotopic, biostratigraphic, paleomagnetic, and geochemical data, Wilson *et al.* favor the 'death-in-the-tropics' hypothesis.

The unsolved mysteries of guyots should encourage creationists to examine the evidence closely and reinterpret the hard data within our paradigm. I will suggest a few ideas. First, it is likely guyots do represent a large relative sea level rise, probably at the end of the Flood, because some guyots are flat-topped volcanoes that are not capped by carbonate or any reefal material, and hence were probably sheared off near sea level.[10] (One of the evidences for sea level erosion of guyots is shallow water benthic organisms, but within a Flood

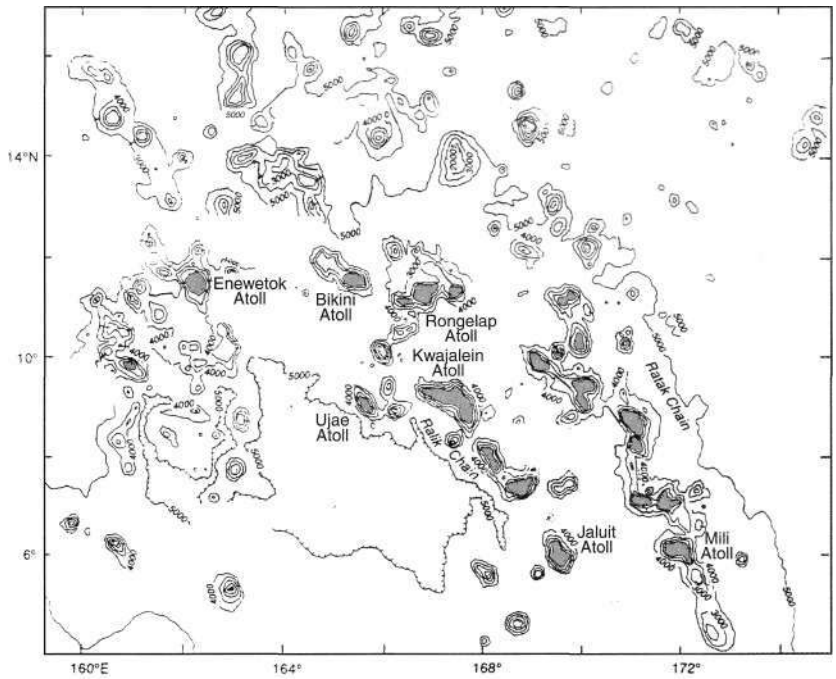

Figure 1. *Guyots and platforms in Marshall Islands. Islands and atolls shaded. Contour interval is 1000 m (from* Introduction by Shipboard Scientific Party).[19]

model these could have been transported, so their paleodepth significance is lost.)

Second, the assumed reefal nature of the carbonate cap can be challenged. New information from dredging and ODP drilling cores supports this reinterpretation. The carbonate cap has both biogenic (reef derived) and **inorganic** components.[11] The carbonate is very thick on some guyots, which surprised the shipboard scientists on ODP leg 143 and 144.[12] For instance, ODP leg 143 drilled through 1620 m of carbonate on Resolution Guyot in the Mid-Pacific Mountains.[13] ODP legs 143 and 144 discovered that reefal organisms are rare and isolated in the carbonate.[1314] Their reefal nature is thus questionable. This is similar to carbonates on land that are claimed by some to be reefs, but yet there is evidence against this hypothesis.[15] Scientists on ODP leg 143 drilled into a perimeter mound that they thought was an ancient barrier reef on Resolution Guyot, but found it was not a reef.[1617] Thus, the new results have not supported previous hypotheses: ' *... the drilling results show that many long-held ideas are misconceptions.*' [18]

Third, it is possible that some guyots represent remnants of a broken up, drowned carbonate platform. This was actually suggested by the shipboard scientific party of leg 143. Hence, the guyots in the Mid-Pacific Mountians may be remnants of an **extensive carbonate platform** and not a series of drowned reefs:

> *'This finding suggests that the Mid-Pacific Mountains may have been an extensive shallow-water platform during the Early Cretaceous. The contribution of reefs to the building of the shallow-water limestone cap may have been overestimated, as reef debris is surprisingly sparse throughout the section at Site 866.'*[18]

It is interesting that fragments of woody plants and coal (obviously not reef debris) were also discovered in the carbonate.

If an extensive carbonate platform in the Mid-Pacific Mountians and other areas formed during the Flood, a simple solution to the thick carbonate cap on Eniwetok Island may be possible (Figure 1). Eniwetok Island (also called Anewetak) is a coral atoll in the Marshall Islands, some 1000 km southwest of the Mid-Pacific Mountains. The atoll is one of several in the region and stands on top of about 1200 to 1400 meters of carbonate rock interpreted as reef rock.[19] The carbonate lies on top of a volcanic base, which supposedly sank slowly enough for the reef to grow upward. It is considered one of several outstanding examples of a contradiction to the young earth time scale from Scripture. Anti-creationist Arthur Strahler states the problem this way:

> *'Using a rate of l cm/yr as the rate of upward growth, assumed continuous and constant, 1,300 m of reef rock would require 130,000 years to accumulate .... If, as the creation scientists assert, modern reefs were produced in the post-Flood time of 4,300 years, the available time is far too short to account for the Eniwetok carbonate deposit.'* [20]

But if Eniwetok Island is simply a circular reef formed on part of an old, broken-up carbonate platform and not 1,400 m of reefal material, the creationist problem of accounting for this much reef growth disappears. As already mentioned, Eniwetok Atoll is accompanied by many nearby guyots (Figure l).[21] The size of many of the guyots in the Western Pacific also favors a broken-up carbonate platform rather than a series of drowned reefs atop volcanoes, since the tops of many guyots have an area often over 500 km^2. Some even exceed 1000 km^2.[22] As a result, Smoot leans towards the view that Dutton Ridge, a series of guyots just east of the junction of the Mariana and Izu-Bonin Trenches, was once a plateau that has since been broken up.[22] It is interesting that the heights of the guyots on Dutton Ridge range from 1300-2375 m below sea level, implying that different pieces of the plateau sank relative to each other. These heights are not far from the depth range between Eniwetok Atoll and adjacent guyots in the Marshall Islands.

References

1. Rougerie, F. and Fagerstrom, J.A., 1994. Cretaceous history of Pacific Basin guyot reefs: a reappraisal based on geothermal endo-upwelling. *Palaeogeography, Palaeo-climatology, Palaeoecology,* 112:239-260.
2. Winterer, E.L. and Metzier, C.V., 1984. Origin and subsidence of guyots in Mid-Pacific Mountains. *Journal of Geophysical Research,* 89(B12):9969-9979.
3. Wilson, P.A., Jenkyns, H.C, Eiderfieid, H. and Larson, R.L, 1998. The paradox of drowned carbonate platforms and the origin of Cretaceous Pacific guyots. *Nature,* 392(6679):889-894.
4. Wilson *et al,* Ref. 3, p. 889.
5. A rudist is a type of extinct bivalve. One shell is conical and the other forms a cap for the open end of the cone.
6. Schlager, W., 1981. The paradox of drowned reefs and carbonate platforms. *Geological Society of America Bulletin,* Part I, 92:197-211.
7. Dolines are bowl-, cone- or well-shaped depressions in limestone areas.
8. McNutt, M.K., Winterer, E.L., Sager, W.W., Natland, J.H. and Ito, G., 1990. The Darwin Rise: a Cretaceous superswell? *Geophysical Research Letters,* 17(8): 1101-1104.
9. Wilson *et al,* Ref. 3, p. 890.
10. McNutt *et al,* Ref. 6, p. 1101.
11. Wilson *et al,* Ref. 3, p. 889.
12. Sager, W. *et al.,* 1993. Examining guyots in the Mid-Pacific Mountains. *EOS,* 74(17):201-208.
13. Shipboard Scientific Party, 1993. Synthesis of results, leg 143. In Sager, W.W., Winterer, E.L., Firth, J.V. *et al., Proceedings of the Ocean Drilling Program, Initial Reports,* 143:13-29.
14. Shipboard Scientific Party, 1993. Introduction and scientific objectives; In: Sager, W.W., Winterer, E.L., Firth, J.V. *et al., Proceedings of the Ocean Drilling Program, Initial Reports,* 143:7-12.
15. Roth, A. A., 1995. Fossil reefs and time. *Origins,* 22(2):86-104.
16. Sager *et al,* Ref. 10.
17. Shipboard Scientific Party, Ref. 14, p. 10.
18. Shipboard Scientific Party, Ref. 13, p. 22.
19. Sailer, A.H. and Koepnick, R.R., 1990. Eocene to early Miocene growth of Enewetok Atoll: insight from stronium-isotope data. *Geological Society of America Bulletin,* 102:381-390.
20. Strahler, A.N., 1987. *Science and Earth History — the Evolution/Creation Controvery.* Prometheus Books, Buffalo, N.Y., p. 224.
21. Shipboard Scientific Party, 1993. Introduction. In Silva, L, Haggerty, J., Rack, F., *et al, Proceedings of the Ocean Drilling Program, Intital Reports,* 144:3-4.
22. Smoot, N.C., 1989. The Marcus-Wake seamounts and guyots as paleofracture indicators and their relation to the Dutton Ridge. *Marine Geology,* 88:117-131.