Subaqueously welded ash flow tuffs

I greatly enjoyed the recent article by Mike Oard[1] discussing the likelihood that at two separate locations on Earth, welded ash flow tuffs formed underwater. Volcanic processes present exciting opportunities for creative thinking by young-Earth creationists because these explosive events are not occurring today as they did in the past. Subaqueously emplaced welded ash flow tuffs present just one example where we would expect a difference in interpretation between the Flood framework and the concept of uniformitarianism.

Unfortunately, the acknowledgment by uniformitarian volcanologists that welded ash flow tuffs can form subaqueously has been rather slow in coming. The latest publication defining the present state of knowledge regarding volcanology[2] does not even mention the possibility of welded ash flow tuffs in an underwater setting. However, this oversight should not be taken as any indication that this process has not occurred in Earth's past, is not occurring today, or cannot occur in the future.

Figure 1. *The Goat Mountain exposure is composed entirely of layered and welded volcanic strata that rise approximately 520 m above the desert floor in Big Bend National Park, Texas. This is one of many exposures of volcanic strata found across the Park. The energy associated with the Flood best explains both the large-scale eruptions and subsequent removal of tremendous volumes of volcanic strata.*

Perhaps the best research regarding the formation of subaqueously welded ash flow tuffs has been conducted by Dr Cathy Busby-Spera,[3,4] for an area within the southern Sierra Nevada known as the Mineral King pendant. Approximately six separate volcanic units were identified across this area and all of them are defined as having formed and welded underwater. Anyone interested in the subject of subaqueously welded ash flow tuffs is encouraged to review these references.

Figure 2. *The Chisos Mountains from a distance of approximately 10.5 km. These intrusive and extrusive volcanic mountains rise 2.4 km above the desert floor and represent large-scale eruptions and tremendous erosion that only the Flood can explain. Dr E. L. Williams postulated that over 1.6 km of strata have been removed to expose these rhyolitic peaks today.*[18]

Several years ago, I defined a number of volcanic welded ash flow tuffs from Big Bend National Park as having formed underwater.[5–7] During the course of my investigations I was able to identify only a small number of references that support the concept of subaqueous welding of ash flow tuffs (see references therein). It was clear in reading the literature that most uniformitarian volcanologists reject this possibility only because it has not happened where this process could be observed today. Apparently, this rather myopic uniformitarian position continues, based on statements made in the recent article by Kokelaar and Königer.[8] Fortunately, work continues in this area of volcanology and new information on the subaqueous formation of ash flow tuffs will continue to come to light.

John Day Country Volcanics

Oard proposed that the Rattlesnake Tuff of east-central Oregon formed underwater by eruptions from a nearby caldera.[9] These eruptions occurred

during the Flood and subsequent erosion during this same period of time removed a significant volume of volcaniclastic material. Oard presents a most compelling case—one in which I am in full agreement.

During the review of my article on Goat Mountain, I was asked why the stratigraphy of the John Day Country with its significant volcanic deposits would be interpreted by young-Earth creationist Stuart Nevins[10] as post-Flood when I was interpreting a similar stratigraphic setting as Flood deposited. In my investigations of volcanic deposits found across Big Bend National Park, I came to realize that much of the volume of the original deposits had been eroded and removed. It became apparent to me that the timing of the volcanism coincided with erosion and not deposition. The amount of geologic energy required to erupt and emplace thousands of feet of volcanic strata over tens to hundreds of square miles and then erode significant volumes of the same strata appears to require a time during the Flood, not after[11] (Figures 1 and 2). Obviously, Oard[12] reached the same conclusion for the Rattlesnake Tuff.

It was noted in my Goat Mountain[13] article that recent work conducted by Dr Steve Austin at Mount St. Helens[14] seems to me to run counter to what Nevins[15] had proposed for the John Day Country. I envisioned most (if not all) of the John Day Country volcanics as having been erupted and eroded during the Flood, a proposal that runs counter to the position taken by Nevins.[15] He interprets the Rattlesnake tuff as a post-Flood deposit,[16] while Oard is more in line with my thinking that it formed and was eroded during the Flood.[9]

Volcanic terrain in a young-Earth creationist framework

Young-Earth creationists are able to think outside the limited boundaries of uniformitarian interpretation when dealing with volcanic settings. The tremendous volcanic events that occurred during and following the Flood would appear to have no modern analogue. We cannot adopt the 'standard' uniformitarian assumptions and expect to derive a sound and competent Flood framework in which to define volcanic settings.[17] We must postulate and explore other interpretations regarding volcanic settings so that the short time frames in which we define the Earth's brief history can be addressed. Independent of my own work on subaqueous volcanism, Mike Oard has reached similar conclusions, and has taken an important and necessary step toward redefining creationists' understanding of volcanic processes with regard to welded ash flow tuffs in the John Day Country.

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References

1. Oard, M. J., Can welded tuffs form underwater? *TJ* **16**(2):114–117, 2002.
2. Sigurdsson, H., *Encyclopedia of Volcanoes,* Academic Press, New York, NY, 2000.
3. Busby-Spera, C., Large-volume rhyolite ash flow eruptions and submarine caldera collapse in the lower Mesozoic Sierra Nevada, California, *Journal of Geophysical Research* **89**(B10):8417–8427, 1984.
4. Busby-Spera, C., Depositional features of rhyolitic and andesitic volcaniclastic rocks of the Mineral King submarine caldera complex, Sierra Nevada, California, *Journal of Volcanology and Geothermal Research* **27**:43–76, 1986.
5. Froede, C. R., Jr, Thunder eggs: evidence for subaqueous deposition? (Big Bend National Park, Texas), *Creation Research Society Quarterly* **32**:101–104, 1995.
6. Froede, C. R., Jr, Evidence of catastrophic subaqueous processes at Goat Mountain, in Big Bend National Park, Texas, USA, *Creation Research Society Quarterly* **33**:115–126, 1996.
7. Froede, C. R., Jr., An unconformity boundary exposed at the lower Tornillo Creek Bridge, Big Bend National Park, Brewster County, Texas, USA, *Creation Research Society Quarterly* **34**:147–153, 1997.
8. Kokelaar, P. and Königer, S., Marine emplacement of welded ignimbrite: The Ordovician Pitts Head Tuff, North Wales. *Journal of the Geological Society of London* **157**:517–536, 2000.
9. Oard, Ref. 1, p. 116.
10. Nevins, S. E., Post-Flood strata of the John Day Country, northeastern Oregon; in: Howe, G.F. (Ed.), *Speak to the Earth: Creation studies in geoscience,* Creation Research Society Books, St. Joseph, MO, pp. 221–252, 1974.
11. See Froede, C.R., Jr., *Field Studies in Catastrophic Geology,* Creation Research Society Books, St. Joseph, MO, 1998.
12. Oard, Ref. 1, pp. 115–116.
13. Froede, Ref. 6, pp. 123–124.
14. Austin, S. A., *Mount St. Helens: A Slide Collection for Educators*, Geology Education Materials, El Cajon, CA, 1991.
15. Nevins, Ref. 10, pp. 246–249.
16. Nevins, Ref. 10, p. 246.
17. In 1998, several friends and I proposed that the Precambrian Pikes Peak Iron Formation (actually a banded iron formation) found in central Arizona, USA, was created during the Flood due to subaqueous volcanism. The 'standard' prograding delta interpretation, postulated by uniformitarian thinking, was not acceptable within the young-Earth Flood framework. See Froede, C.R., Jr., Howe, G.F., Reed, J.K. and Meyer, J.R., A preliminary report on the Precambrian Pikes Peak Iron Formation, Yavapai County, Arizona, *Creation Research Society Quarterly* **35**:15–22, 1998.
18. See Williams, E.L., Chisos Mountains, *Creation Matters* **7**(4):5, 2002.

Dinosaur footprints, fish traces and the Flood

In his Perspectives article, Woodmorappe[1] draws attention to recent work[2] reinterpreting certain alleged dinosaur tracks as impressions left by rays. However, he adds several comments of his own that appear to us to be unwarranted and open to challenge.

First, Woodmorappe jumps far too quickly from the specific reported cases to general statements.

> 'This admits the possibility that many "vertebrate track" surfaces in the fossil record do not require any subaerial exposure of sedimentary surfaces during the Flood.'
> 'Much more study is obviously warranted before we have solid criteria for distinguishing genuine dinosaur trackways from traces