Ice Age megafloods provide insight into Flood sedimentation

Michael J. Oard

As soon as uniformitarianism was introduced to geologists by the publication of Lyell's *Principles of Geology* from 1830 to 1833, it was intellectually assaulted by the discovery of the Ice Age. Since massive ice sheets no longer cover northern North America, northwestern Eurasia, and many of the mountains of the world, their existence greatly surprised the advocates of the uniformitarian principle:

> "The most important point about the controversy over the Ice Age was that any such episode in the geologically recent past was *totally unexpected* by leading geologists of all stripes: by Buckland no less than by Lyell, to mention just two representative figures [emphasis original]."[1]

The uniformitarian principle was again challenged in the 1920s and 1930s by the discovery of the Lake Missoula flood.[2,3] This flood was a result of a giant Ice Age meltwater lake that was up to 600 m deep, trapped in the valleys of western Montana, USA.[4] The ice dam holding it back in northern Idaho broke and the floodwater rushed over eastern Washington and northern Oregon. The water was up to 300 m deep and moved at a pace of over 125 km/h through the Columbia Gorge between Washington and Oregon.[5] Because of the adherence to uniformitarianism, the concept of the Lake Missoula flood was rejected for 40 years. This was in spite of many years of carefully collected field evidence by J Harlen Bretz. Scientists considered Bretz's 'outrageous hypothesis' too biblical in nature.[6,7] This shows the blinding effect that the assumption of uniformitarianism had in the past and still has on the minds of many secular scientists.[8] It would be surprising if most secular scientists could see evidence for the Genesis Flood in the field, considering the mental block their key assumption creates.

Uniformitarianism, the basic assumption of geology, was again assaulted in the late 1960s and early 1970s when the scientists learned that many circular features found on all of the solid bodies of the solar system were due to impacts and not volcanism.[9,10] These many impacts indicate a past rate of cratering much greater than today; it was easier to believe in volcanic eruptions that are common on the Earth.

Many more Ice Age megafloods

Ever since the acceptance of the Lake Missoula flood, scientists have found evidence for other Ice Age megafloods. Victor Baker catalogued 41 such floods in North America, Eurasia, and southern South America.[11] Carling states:

> "There is growing recognition that sedimentary deposits related to high-energy, large-scale, freshwater floods are widespread across the continents and, in the main, can be related to Quaternary [Ice Age] outbreak flows from ice-dammed lakes."[12]

These megafloods do not include megafloods that may have issued forth from under the ice sheets, as advocated by John Shaw and colleagues.[13] Most glaciologists reject Shaw's ideas, mainly because they do not know of a source of water within the area bounded by the ice sheets.

Megafloods cause rapid, layered sedimentation

Megaflood sedimentation shows just how fast layers can form. In depositional areas, usually slackwater valleys, and not including large bars, the sediments from megafloods rapidly formed multiple layers. These layers are commonly called rhythmites. They

Figure 1. Lake Missoula flood rhythmites from the Yakima River Valley, Washington, USA. Notice the white volcanic ash layer from Mount St Helens near the top of the rhythmites (arrow). The rhythmites are mildly deformed from slumping along the edge of a cliff above the Yakima River.

were formed quickly by waning and waxing flow. A rhythmite is a repeating sequence of two or more sedimentary layers. The waxing and waning flow is caused by pulses of water resulting from the convergence and divergence of water, especially in anastomosing flow,[11] which forms branching and reconnecting channels. The Lake Missoula flood was an anastomosing flow since it spread to a width of 160 km over eastern Washington with numerous channels until entering a newly formed lake, 245 m deep, in the Pasco Basin. The temporary lake formed because the water could not drain through Wallula Gap as fast as it was entering the lake. It is likely that convergent and divergent flow would cause waves on this lake that would have pulsed up the tributary valleys of the Pasco basin. Many rhythmites formed quickly (figure 1). Some geologists believe that the 40 rhythmites observed in these tributary valleys to the Pasco Basin were formed by pulses in one large flood.[14]

Dozens of Lake Missoula floods questionable

Rapid formation of multiple rhythmites in a giant flood was demonstrated in a 1996 Icelandic subglacial flood. As the flood issued from underneath the ice cap, it spread into a small slackwater embayment and quickly formed rhythmites along with other sediments.[15,16] Although the flow rate was only 0.2% of the Lake Missoula flood, this Icelandic flood managed to deposit 200 planar rhythmites and other sedimentary layers 15 m deep in just 17 hours! The rhythmites were formed by short-period pulses of water that waxed and waned.[17] The Lake Missoula flood eroded about 200 km^3 of basalt and silt in eastern Washington and deposited the sediments over a wide area, especially in expansion bars. The 30–40-m-thick deposit of rhythmites that formed within the tributary valleys of the Pasco Basin are about the thickness one would expect from a single Lake Missoula flood. Taking into account the data on the Icelandic flood sedimentation, it is questionable how each rhythmite in the Lake Missoula flood could be a separate flood, as many geologists still claim. It was a volcanic ash layer in the rhythmites that spawned the multiple floods theory. There is much more evidence that supports the Lake Missoula flood being only one and not many floods.[2,3,16,18]

Some geologists believe that there were 90 or more Lake Missoula floods at the peak of the 'last' ice age. This was based on rhythmites from the Sanpoil Valley of north central Washington. However, John Shaw and colleagues found strong evidence that these rhythmites were not from numerous Lake Missoula floods.[19] They determined this because they found no basalt fragments in the rhythmites that are located only 10 km north of the Columbia River Basalts. The Lake Missoula flood would have had to travel over the basalt outcrops, transporting fragments up the Sanpoil Valley to deposit rhythmites. Instead, it appears these particular rhythmites were probably generated by annual melting and sedimentation from a finger of the Cordilleran Ice Sheet that lay just to the north in the Sanpoil Valley.

How is the ash layer in the rhythmites explained?

The main evidence for the multiple floods theory is a volcanic ash layer, thought to be from Mount St Helens,[20] that was found near the top of one of the rhythmite sequences, as shown in figure 1 (arrowed). An eruption of Mount St Helens was claimed to be too rare an event to have left a record in the sediments of one flood that lasted only a week. The ash layer was therefore thought to have been deposited on bare ground on top of a rhythmite, suggesting that each rhythmite was a separate flood, separated by dozens of years. It is a reasonable argument and practically all geologists have believed it.

However, evidence now exists in the literature that would connect these two events.[21] It has been demonstrated that the filling of a reservoir can cause weak to strong earthquakes. For instance, the slow impoundment of water behind Koyna Dam in India caused numerous earthquakes, one a magnitude 6.3 earthquake that killed 200 people.[22,23] It is suggested that the filling of the new Zipingpu Dam in China caused the great magnitude 7.9 earthquake in Sichuan that killed 80,000 people.[23,24] The filling of reservoirs on the upper Yangtze River in China is believed by some scientists to have caused a magnitude 6.5 earthquake that killed more than 600 people.[25]

A strong connection between earthquakes and volcanoes or magmatism has been shown by many investigators.[26–29] Simpson stated:

> "The geophysics reported in the Oct. 29 NATURE that 8 of the study's 204 earthquakes of magnitude 8.0 or greater seemed to trigger *same-day* eruptions within 750 km (emphasis mine)."[26]

Such a statistical relationship is significant, given the rarity of the events. However, the volcanoes that did erupt were those which were already giving indications that an eruption might occur.[30]

Mount St Helens is one of the most active volcanoes in North America; it erupts about every 125 years. It is only 240 km west of the centre of the lake in Pasco Basin. Instead of taking years to fill, this lake became 245 m deep within a few days. It seems reasonable that such a weight of water could have triggered earthquakes strong enough to cause Mount St Helens to erupt, spreading the ash eastward in the prevailing upper winds. The location of the ash layer near the top of the rhythmites, which incidentally thin upward, is about what would be expected if it were the result of a chain of events initiated by the Missoula flood.

Implications for Flood geology

Sedimentation in slackwater areas of Ice Age megafloods and the subglacial flood from an Icelandic ice cap provide insights into sedimentation during the Genesis Flood. Megaflood sedimentation shows just how quickly sediments can be deposited and layered in areas where current velocity decreases. Layers form naturally in moving water by the deposition of particles of different sizes and densities.[31] Uniformitarian scholars have been of the opinion that the sedimentary rocks on the continents were too thick to have formed quickly in the Genesis Flood.[32] However, observations of megafloods show that an event such as the Genesis Flood would be capable of depositing all the sedimentary rocks. If the Lake Missoula flood was magnified into a deluge covering the whole Earth, combined with the turbulence caused by the Earth's rotation and other recorded events, it is not difficult to see the potential of depositing the estimated average of 1,800 m[32] of layered sedimentary rocks on the continents.[33]

It has been observed that rhythmites resemble a series of turbidites, the depositional product of turbidity currents.[34] Turbidites represent a significant proportion of total sedimentary rock strata, and are assumed to have been deposited in submarine downslope mass movements. Although turbidites generally consist of fining-upward sediments, there are many complications and missing layers in the classical turbidite models.[35] The concept of turbidites is itself vague and frequently an oversimplification.[36] The similarity to rhythmites raises the possibility that features identified as 'turbidites' may simply be the depositional result of waxing and waning currents, instead of, or in addition to, downslope movement of sediments. The waxing and waning currents that produced the rhythmites in Iceland and in the Lake Missoula flood would have been a common occurrence during the Genesis Flood and it is possible that they could have accounted for the turbidites in sedimentary rock layers.

Reference

1. Rudwick, M.J.S., *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform*, The University of Chicago Press, Chicago, IL, pp. 550–551, 2008.
2. Oard, M.J., *The Missoula Flood Controversy and the Genesis Flood*, Creation Research Society Books, Chino Valley, AZ, 2004.
3. Oard, M.J., *The Great Missoula Flood: Modern Day Evidence for the Worldwide Flood*, Awesome Science Media (DVD), Canby, OR, 2014.
4. Smith, L.N., Stratigraphic evidence for multiple drainings of glacial Lake Missoula along the Clark Fork River, Montana, USA, *Quaternary Research* **66**:311–322, 2006.
5. Benito, G. and O'Connor, J.E., Number and size of last-glacial Missoula floods in the Columbia River valley between the Pasco Basins, Washington, and Portland, Oregon, *GSA Bulletin* **115**(5):624–638, 2003.
6. Alt, D., *Glacial Lake Missoula and its Humongous Floods*, Mountain Press Publishing Company, Missoula, MT, p. 17, 2001.
7. Allen, J.E. and Burns, M., with Sargent, S.C., *Cataclysms on the Columbia*, Timber Press, Portland, OR, p. 44.
8. Because of the assaults on uniformitarianism, geologists now accept a few catastrophes, but essentially uniformitarianism rules and is the basis for secular earth science.
9. Marvin, U.B., Impact and its revolutionary implications for geology; in: Sharpton, V.L. and Ward, P.D. (Eds.), *Global Catastrophies in Earth History: An Interdisciplinary Conference on Impacts, Volcanism, and Mass Mortality*, GSA Special Paper 247, Geological Society of America, Boulder, CO, p. 147, 1990.
10. Oard, M.J., An impact Flood submodel—dealing with issues, *J. Creation* **26**(2):73–81, 2012.
11. Baker, V.R., Global late Quaternary fluvial paleohydrology with special emphasis on paleofloods and megafloods; in: Wohl, E.E. (Ed.), *Treatise in Fluvial Geomorphology*, Elsevier, New York, 2013.
12. Carling, P.A., Freshwater megaflood sedimentation: what can we learn about generic processes? *Earth-Science Reviews* **125**:87, 2013.
13. Shaw, J., In defence [sic] of the meltwater (megaflood) hypothesis for the formation of subglacial bedform fields, *J. Quaternary Science* **25**(3):249–260, 2010.
14. Carling, ref. 12, p. 102.
15. Russell, A.J., and Knudsen, O., An ice-contact rhythmite (turbidite) succession deposited during the November 1996 catastrophic outburst flood (jökulhlaup), Skeidarájökull, Iceland, *Sedimentary Geology* **127**:1–10, 1999.
16. Oard, M.J., Only one Lake Missoula flood, *J. Creation* **14**(2):14–17, 2000.
17. Carling, ref. 12, pp. 102–103.
18. Oard, M.J., Further evidence of only one large Lake Missoula flood, *J. Creation* **26**(3):3–4, 2012.
19. Shaw, J., Munro-Stasiuk, M., Sawyer, B., Beanery, C., Lesemann, J.-E., Musacchio, A., Rains, B. and Young, R.R., The Channeled Scabland: back to Bretz? *Geology* **27**(7):605–608, 1999.
20. Mullineaux, D.R., Wilcox, R.E., Ebaugh, W.F., Fryxell, R. and Rubin, M., Age of the last major scabland flood of the Columbia Plateau in Eastern Washington, *Quaternary Research* **10**:171–180, 1978.
21. Oard, ref. 2, pp. 50–52.
22. Gupta, H,K., Radhakrishna, I., Chadha, R.K., Kümpel, H.-J. and Grechsch, G., Pore pressure studies initiated in area of reservoir-induced earthquakes in India, *EOS, Transactions of the American Geophysical Union* **81**(14):145, 151, 200.
23. Kerr, R.A. and Stone, R., A human trigger for the great quake of Sichuan? *Science* **323**:322, 2009.
24. Kerr, R.A. and Stone, R., Two years later, new rumblings over origin of Sichuan quake, *Science* **327**:1184, 2010.
25. Qui, J., Chinese data hint at trigger for fatal quake, *Nature* **513**:154–155, 2014.
26. Simpson, S., Big shocks push volcanoes over the edge, *Science News* **154**:279, 1998.
27. Linde, A.T. and Sacks, I.S., Triggering of volcanic eruptions, *Nature* **395**:888–890, 1998.
28. Hill, D.P. *et al.*, Seismicity remotely triggered by the magnitude 7.3 Landers, California, earthquake, *Science* **260**:1617–1623, 1993.
29. Power, J.A., Moran, S.C., McNutt, S.R., Stihler, S.D. and Sanchez, J.J., Seismic response of the Katmai volcanoes to the 6 December 1999 magnitude 7.0 Karluck Lake earthquake, Alaska, *Bulletin of the Seismic Society of America* **91**:57–63, 2001.
30. Prejean, S.G. and Haney, M.M, Shaking up volcanoes, *Science* **345**:39, 2014.
31. Berthault, G., Experiments on stratification; in: Walsh, R.E. (Ed.), *Proceedings of the Third International Conference on Creationism*, technical symposium sessions, Creation Science Fellowship, Pittsburgh, PA, pp. 103–110, 1994.
32. Reed, J.K. and Oard, M.J., Three early arguments for deep time—part 3: the 'geognostic pile', *J. Creation* **26**(2):100–109, 2012.
33. This figure does not include the sediments and sedimentary rocks eroded off the continents during the Recessional Stage of the Flood and is now along the continental margin.
34. Carling, ref. 12, p. 87–113.
35. Middleton, G.V., Sediment deposition from turbidity currents, *Annual Review of Earth and Planetary Science* **21**:89–114, 1993.
36. Shanmugam, G., 50 years of the turbidite paradigm (1950s–1990s): deep-water processes and facies models–a critical perspective, *Marine and Petroleum Geology* **17**:285–342, 2000.