

Pediments

I am writing to comment on Mike Oard's excellent article on Pediments.¹ As he points out, pediment formation has been hotly debated in geomorphology circles, and all theories fail to explain certain common features. Mike was kind enough to show me some pediments in Wyoming and Montana this past summer, and I was especially impressed with steeply dipping sedimentary strata truncated by pediment surfaces (e.g. figure 1). It appears they must have had a catastrophic origin. Oard argues that (all?) pediments were cut as the result of strong currents from retreating floodwaters. I encourage him to continue to develop his hypothesis with additional field work and mapping pediment details.

One of the strongest arguments for his formation mechanism is the often small percentages of exotic gravels that can be found on many pediment surfaces. If strong currents have indeed deposited these exotic rocks, it seems he could predict some other features that should be associated with pediments as well.

Oard is well acquainted with the Missoula Flood.² Not only did this 'super flood' cause enormous amounts of erosion (canyons, hanging valleys, dry falls, plunge pools, etc.), but the strong currents of moving water also



Figure 1. Pediment in the Ruby Valley along the western slope of the Gravelly Range of south-west Montana.¹

produced a number of depositional features (giant current ripples, huge gravel bars, gravel-filled side valleys, rhythmite deposits, deltaic deposits, etc.). Ultimately, it was the depositional features that likely convinced many mainstream geologists of the validity of Bretz's 'super flood' hypothesis for the origin of the Channeled Scablands.³ If strong currents from retreating floodwaters cut pediments, I would encourage Oard to look for Missoula-like depositional features in association with pediments (perhaps on a larger scale). Also, pediment-like features should be sought for in the Missoula Flood drainage. This 'super flood' may be an ideal test case for his pediment formation hypothesis. If these features cannot be found, the solution to the 'pediment problem' may continue to elude geologists, catastrophist and uniformitarian alike.

One other brief point: as Flood geologists, we need to be exceptionally careful about evidence that indicates depositional processes. On page 16 Oard writes:

'The coarse gravel capping of a pediment is generally rounded, indicating that *water was involved in depositing the veneer and likely shaping the pediment*' (italics Oard's).

Rounded gravels do not indicate a *depositional* process; they indicate a *transportation* process. Evidence such as *well-sorted* gravels would indicate a depositional process. What is the sorting like on gravelled pediment surfaces? Do sedimentary structures in the gravels indicate current flow perpendicular to, or parallel to, the pediments? The answer to these questions would refute or help confirm Oard's hypothesis.

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References

1. Oard, M.J., Pediments formed by the Flood: evidence for the Flood/post-Flood boundary in the Late Cenozoic, *TJ* 18(2):15–27, 2004.
2. Oard, M.J., Evidence for only one gigantic

Lake Missoula flood; in: Ivey Jr, R.L. (Ed.), *Proceedings 5th International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, pp. 219–231, 2003.

3. Bretz, J.H., The Lake Missoula floods and the Channeled Scabland, *J. Geology* 77:505–543, 1969.

Michael Oard replies:

I thank John Whitmore for his compliments on my pediment paper, and I enjoyed our field time together. In regard to the Channeled Scabland of eastern Washington, I have been looking for a long time for pediments from the Lake Missoula flood. I have found dissected planation surfaces, but I have found nothing I would consider a pediment, although there are some possibilities. It could be that basalt is not conducive to the formation of pediments. I have noticed that some areas, like the Rocky Mountains and John Day Country of Oregon, have many pediments, but other areas have none. There are several variables involved, besides current speeds, during the pediment formation process.

I am also looking for Missoula flood-like features in the meso-scale and macro-scale features of the earth, for which I have found suggestions here and there.

I thank John for pointing out that the rounding of rocks indicates a watery transport process and not a depositional process. One can say that water was at least involved in the transport process when the clasts were rounded. My paper focused on the geometric form of the pediment, which is the focus of practically all geomorphological research and deductions on pediments. Outcrops within the pediment gravels are not very abundant, but I think an analysis of this gravel can be made at several locations in Montana. I thank John, as well as other reviewers, for the suggestions for future research.

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