Chapter 23

Gravel Transport Can Determine Late Flood Tectonics

The locations of all the quartzite gravel in the northwest states and adjacent Canada provide more information about the Flood than just reinforcing the two phases of its Retreating Stage.[1] It also tells us about tectonics and the location of the early continental divide during Flood runoff.

The Mountains Rise and the Valleys Sink

It appears the quartzites first spread when few mountains or barriers blocked the Flood's flow and the bottom of the Floodwater was fairly flat. This conclusion is based on the wide geographic spread of the quartzites from their source in the western Rocky Mountains, and the fact quartzites are sometimes found several mountain ranges away from their source. The quartzite rocks certainly did not flow up and down mountain ranges. So these mountain ranges did not exist when the quartzites were first spread. For instance, the Puget Sound quartzites arrived *before* the Cascade and Okanogan Mountains were uplifted. The quartzites in the Jackson Hole, Bighorn, Wind River, and southwest Powder River Basins had to have been transported before the Teton Mountains, Wind River, Bighorn, and other mountain ranges had uplifted. Of course, quartzites continued to spread as the mountains uplifted.

Since quartzites still remain on the tops of the Blue Mountains of central Oregon, the Wallowa Mountains of northeast Oregon, the Gravelly Mountains of southwest Montana, the Teton Mountains of northwest Wyoming, and possibly other ranges, mountain uplift must have carried the quartzites upward. Therefore, uplift was one of the last events of the Flood. If it happened over millions of years, the rocks would have weathered and eroded from the surface during uplift. In fact, the quartzites show *no* weathering (some are fractured, probably because they were re-eroded from the very thick deposits from paleovalleys).

Areas east and northeast of Jackson, Wyoming, and just west of Spencer Idaho faulted downward. The deep crack or basin (paleovalleys) then collected thousands of feet of cobbles and boulders. The area was then deformed. East and northeast of Jackson, Wyoming, 85% of the original volume of the deposit was eroded off, implying upward tectonics after the gravel accumulated. It was in deep paleovalleys where pressure solution marks and fractures formed, the top of the accumulation which was later eroded, since we find quartzites with pressure solution marks far from their original paleovalleys. All this activity is in accord with Psalm 104:8 that says the mountains rose and the valleys sank to drain the Floodwater.

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[1] Oard, M.J., J. Hergenrather, and P. Klevberg, 2007. Flood transported quartzites: Part 4—diluvial interpretations. *Journal of Creation* 21(1):86–91.

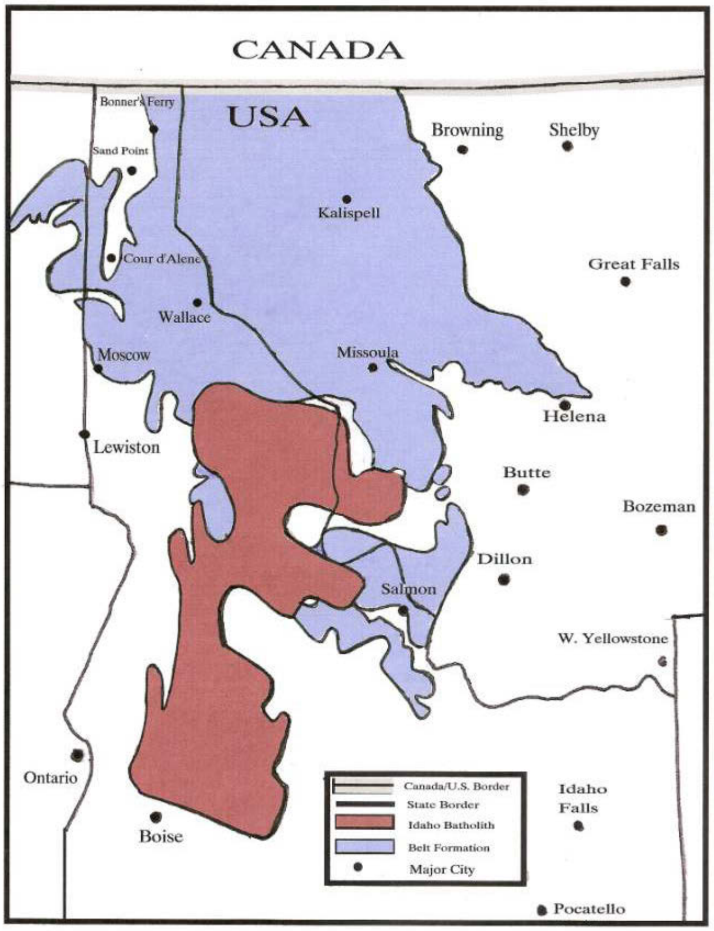

Figure 23.1. Map of the Idaho Batholith and the Belt rocks (drawn by Mrs. Melanie Richard).

Marine fossils found in the quartzite gravels of northwest Wyoming indicate the initial uplift happened underwater as the quartzite gravels spread away from the Rocky Mountains.[2]

The thick limestone conglomerate and breccia deposits of southwest Montana and adjacent Idaho were likely formed very early in the Flood runoff as the mountains were beginning to rise. There is also a huge granite intrusion in central Idaho called the Idaho Batholith (Figure 23.1). It likely has a planation surface whose top is deeply dissected by valleys (Figure 23.2).[3,4,5] The Flood erosion of the sedimentary rocks that once covered the batholith is the most likely source for the thick limestone breccia and conglomerate found east of it, since Flood currents at the beginning of uplift were from the west (see Appendix 11). The planation surface probably formed as the mountains first rose and the thick sheet of limestone was eroded off and deposited up to 5,250 feet (1,600 m) deep in southwest Montana and adjacent Idaho. This eroded limestone debris was then subject to differential vertical tectonics and further erosion, and some of the debris ended up as the tops of mountains, such as the Sphinx in the Madison Range (see Figure A11.1) and the Red Conglomerate Peaks along the Montana/Idaho border (see Figure A11.2). Some of the limestone conglomerate and breccia faulted downward as the valleys sank.

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[2] Love, J.D., 1973. Harebell Formation (Upper Cretaceous) and Pinyon Conglomerate (Uppermost Cretaceous and Paleocene), Northwestern Wyoming, *U.S. Geological Survey Professional Paper* 734-A, U.S. Government Printing Office, Washington, D.C.,

[3] Umpleby, J.B., 1912. An old erosion surface in Idaho: its age and value as a datum plane. *The Journal of Geology* 20(2):139–147.

[4] Mansfield, G.R., 1924. Tertiary planation in Idaho. The Journal of Geology 32:472–486.

[5] Anderson, A.L., 1929. Cretaceous and Tertiary planation in northern Idaho. *The Journal of Geology* 37:747–764.

It was during differential vertical tectonics that quartzite gravel spread southeast and became concentrated mostly in the valleys of southwest Montana. The reason quartzite gravel is rarely associated with limestone conglomerate and breccia is likely because the limestone was pulverized during catastrophic Flood transport.

After the quartzites first spread west of the Rocky Mountains more or less as a sheet and mostly on top of the Columbia River Basalt flows, the Columbia River Basalt buckled and faulted forming east-west ridges and valleys in the Yakima area (Figure 23.3). This explains why quartzites are still found in patches on top of the folds or anticlines.

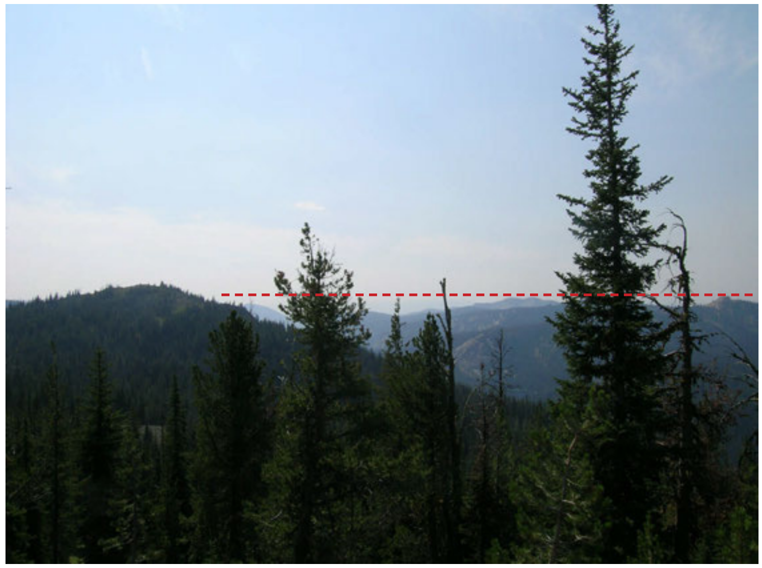

Figure 23.2. Dissected planation surface on top of the Idaho batholith, northeast of Riggins, Idaho.

Figure 23.3. The Rattlesnake Hills, a basalt anticline east of Yakima, Washington. Well-rounded quartzites are on top of this anticline. Note the right-dipping pointed basalt erosional remnants indicating about 1,000 feet (300 m) of erosion occurred on the top of this anticline during and after uplift.

Since quartzite gravel is found in the Snake River Valley, this valley must have been carved during the Channelized Flow Phase of the Flood. The Snake River valley is about 2,000 feet (610 m) deep downstream from Lewiston, Idaho, and becomes shallower as the river approaches its confluence with the Columbia River. Basalt flows probably continued after the river valley was carved, but on a much reduced scale, since local basalt flows are found within the Snake River Valley, sometimes capping quartzite gravel (see Figures 20.1 and 20.2). The channelized erosion of the Snake River Valley must have happened rapidly after most of the basalt cooled. The basalt erosional debris from the Snake River Valley cannot be found downstream, so must have been swept off the continent and into the Pacific Ocean, forming part of the continental margin sedimentary rocks (see Part VI of this volume). It is also possible that the very small volume lava flows that followed the Snake River Valley could have been lava that seeped out of the side of basalt layers before the basalt had totally solidified.

The Thorp Gravel found in the eastern foothills of the Cascade Mountains west of Ellensburg and Yakima, Washington, and the gravel piled up in valleys south of the Clackamas River in the eastern Willamette Valley are likely the last pulse of Flood ero-sion. They were deposited a few hundred feet thick in valleys that had already formed. The channelized Flood currents must have been too weak to transport the gravel out of the area, so the gravel was deposited in the valleys as the Cascade Mountains finished uplifting (see Appendix 12).

The Eastward Shift of the "Continental Divide"

Going back to the Sheet Flow Phase, powerful Floodwater currents quickly spread the quartzites long distances east over a relatively flat surface. Their source was the western Rocky Mountains. Today the source area lies *west* of the continental divide. This means tens of billions of quartz-ite rocks had to have been transported east when the "continental divide" was farther west during early uplift of the Rocky Moun-tains This also explains how the limestone layers on top of the uplifting Idaho Ba-tholith were shattered and spread eastward from the Idaho Batholith west of the divide, forming more than 5,250 feet (1,600 m) of lime-stone debris in southwest Montana. But as the Rocky Mountains continued to uplift, the "continental divide" shifted eastward (Figure 23.4). After the Flood, the continental divide ended up farther east, to where it is today.

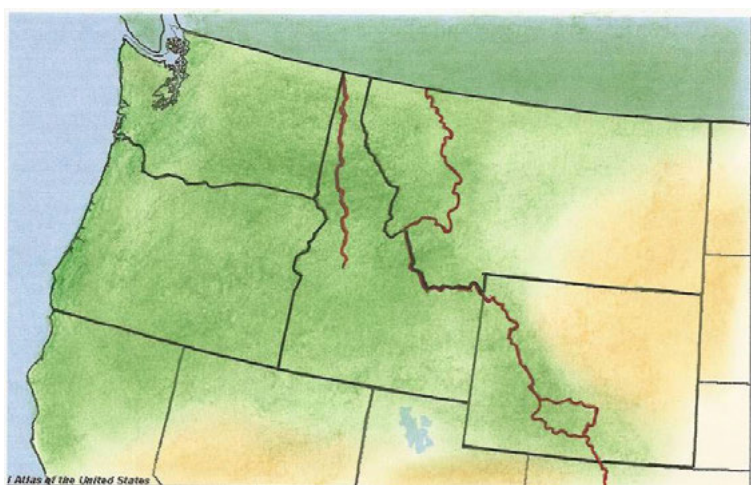

Figure 23.4. Schematic of the divide shifting eastward (drawn by Mrs. Melanie Richard).

There is some geomorphological evidence for this eastward shift of the continental divide during the Retreating Stage of the Flood. The headwaters of the rivers in central Idaho trend northeast and then abruptly cut back around to the west (Figure 23.5).[6] The Salmon River with its generally acute angled tributaries is typical. Aligned wind gaps or passes slice some 3,330 feet (1,000 m) deep across mountains in east-central Idaho and reinforce the northeast trend of channelizing that happened during the Retreating Stage of the Flood. This provides evidence the "continental divide" was once about 100 miles (160 km) west of its present location, and that it shifted east late in the Flood.[6]

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6 Anderson, A.L., 1947. Drainage diversion in the Northern Rocky Mountains of East-Central Idaho. *The Journal of Geology* 55(2):61–75.

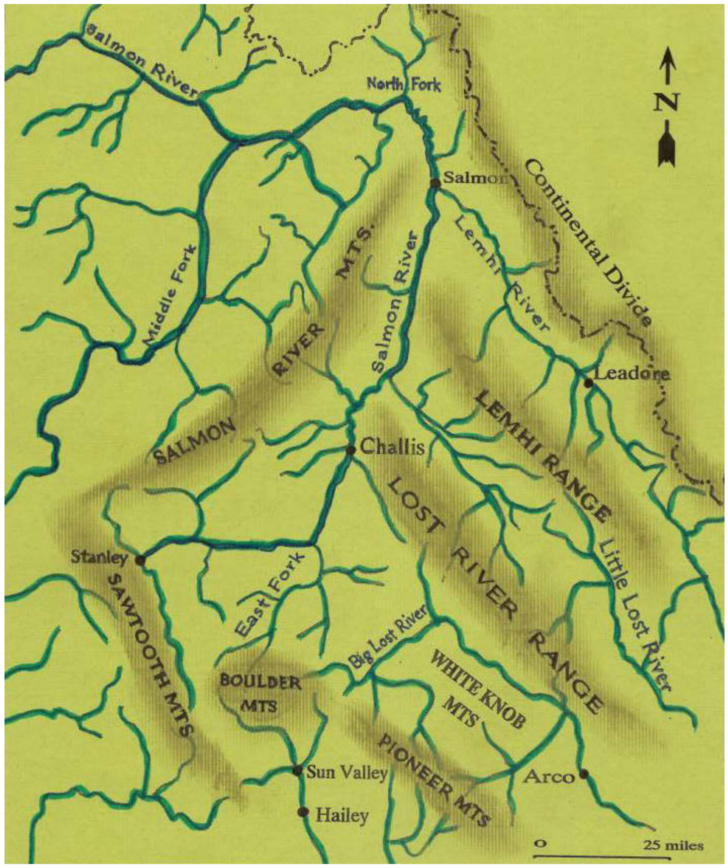

Figure 23.5. Map of mountain ranges and river coursesin central Idaho (drawn by Mrs. Melanie Richard). Note that the river courses, such as the Salmon River with generally acute angled tributaries, trend northeast in their upper reaches and then turn abruptly west.

We have found evidence that the "continental divide" shifted eastward in the southwest United States.[7] A similar situation can be shown in the southwest U.S. in which the Rim Gravels of Arizona (see Chapter 24) indicate Floodwater currents flowed toward the east to northeast, but then the drainage shifted toward the west. Here too the "continental divide" shifted eastward from southwest Arizona into New Mexico and central Colorado.

7 Oard, M.J. and P. Klevberg, 2005. Deposits remaining from the Genesis Flood: Rim Gravels in Arizona. *Creation Research Society Quarterly* 42(1):1–17.