

Detrital zircon geochronology of Bonneville Flood deposits along the Snake River, Idaho: Implications for sediment dispersal patterns of megafloods.

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Abstract

The Bonneville Flood (BF) occurred 14.5 ka and catastrophically lowered Pleistocene Lake Bonneville by 100 m following down-cutting of alluvial fans that formed the lowest threshold of the Bonneville Basin in Idaho near Red Rock Pass. The BF contrasts with multiple floods from glacial Lake Missoula that generated the Channeled Scabland, WA. Detrital zircon has resolved some uncertainties about the provenance and stratigraphy of flood sediments there, but the complex nature of these deposits limits the use of detrital zircon as a tracer in characterizing the sedimentological evolution of individual megafloods. The singular nature of the BF provides an ideal setting to implement detrital zircon to trace sediment transport, dispersal, and deposition for a single megaflood over the reach and regional scale. Detrital zircon samples from six sites along the Snake River from Red Rock Pass to Lewiston, Idaho, suggest that there are several detrital zircon populations that are distinctive of the Bonneville Flood event: Eocene volcanics (60-45 Ma), Cretaceous Idaho batholith (110-70 Ma) Devonian "Antler" grains (450-330 Ma), Ordovician Beaverhead Pluton (500-460 Ma), Proterozoic Grenville recycled grains (1300-950 Ma), and Proterozoic Yavapai-Mazatzal recycled grains (1800-1600 Ma). Relative abundances of these populations indicate that the Bonneville Flood remobilized and reworked Snake River sediment. Several primary modes reflect local influences that become diluted or lost downstream. These strong localized influences on the detrital zircon signature may reflect the hydraulic sorting conditions along the original flood path.