

Shifting shorelines at Lake Tahoe caused by ancient lava dams

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Pleistocene basaltic lavas form a small volcanic field that was erupted from seven vents in the northwestern Lake Tahoe basin. Most of these lavas were erupted above the water and produced lava flows that dammed the lake outlet and flowed into an early Lake Tahoe. The resulting steam explosions produced deltas composed of fragmental deposits as well as pillow lavas.

Consequently, three former raised shorelines are marked by subaerial [lava](#) flows overlying subaqueous lava deltas. In addition, eruptions from isolated vents on the [lake](#) floor produced tuff cones. Six new radiometric argon ages define three episodes when lava erupted subaerially and flowed into the lake. Lava from each of these cycles dammed the lake outlet in the Truckee River Canyon, causing the lake to rise nearly 200 m, after each of which the dams were eroded and the lake returned to near its present level.

The canyon was dammed at 2.3 million years ago (Ma), which raised the lake level from about 1896 m above sea level to 2048 m; again at 2.1 Ma, which raised lake levels from about 1914 m to 2073 m; and finally at 0.94 Ma, which raised lake level to 2085 m. These three raised shorelines indicate that the present outlet of Lake Tahoe through the Truckee River canyon has been operative for at least 2.3 million years.

"The timing of this repetitive volcanic activity raises implications for future volcanic eruptions and their hazards," says study co-author James Moore. "The lake could be dammed by lava again, causing extensive

shoreline flooding as its level rose, or rapid dam failure could cause extensive downstream flooding along the Truckee River on its path to Reno."

More information: Winifred Kortemeier et al. Pleistocene volcanism and shifting shorelines at Lake Tahoe, California, *Geosphere* (2018).
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