

GSA 2014

19-22 October | Vancouver, BC, Canada



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2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

Paper No. 310-7

Presentation Time: 10:45 AM

SILL FAILURE AND CATASTROPHIC OUTBURST FLOODS FROM OWENS LAKE, CALIFORNIA: IMPLICATIONS FOR LATEST PLEISTOCENE AND HOLOCENE PALEOHYDROLOGY OF THE OWENS RIVER DRAINAGE BASIN

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New evidence of sill failure and catastrophic outburst floods from Owens Lake provides explanation on the apparent asynchrony of latest Pleistocene lake levels documented in Owens Lake and China/Searles Lake basins. New stratigraphic and geochronologic studies using subsurface exploration and optically stimulated luminescence (OSL) dating indicate that the sill of Owens Lake basin is dynamic and composed of late Holocene alluvium, contrary to being a stable bedrock sill. Geotechnical data collected from boreholes, seismic surveys, and 1916 construction drawings of North Haiwee Dam reveal downcutting and creation of a deeply entrenched overflow channel through the sill between the last glacial maximum spill level at ~1162 m and a strath cut on the Tertiary Coso Formation at ~1111 m. The geomorphology of the overflow channel suggests downcutting from catastrophic outburst flooding owing to sill failure rather than quiescent spilling. Shoreline stratigraphy suggests that the channel formed from

either one ~50-m downcutting event or several smaller events between ~15.2 and 25 ka. The total drainable volume of Owens Lake related to this downcutting was ~27 km³. Megaflood features downstream of the sill including scabland topography, horseshoe-shaped dry falls, mega-debris flow fans with boulders up to 7 m in diameter, and an extensive (~100 km²) fan delta in China Lake basin provide supporting evidence of outburst flooding. In light of the magnitude of downcutting, the lake-level curve of Owens Lake is being revised using existing radiocarbon (¹⁴C) dates and pending OSL ages from six beach ridges between ~1112 and 1162 m to constrain the age of sill failure(s). Younger ¹⁴C and OSL ages from shoreline and borehole sediments plus geomorphic relations also indicate that Owens Lake and China/Searles Lake basins were likely hydrologically connected from ~15.2 to 11.4 ka, and possibly as recently as ~7.8 ka, when the sill was lower than at present. Continued research is focused on identifying mechanisms for sill failure, and resolving the number and timing of flood events and Quaternary lake levels in China/Searles Lake basin. These new findings provide evidence for more recent hydrologic connections between the two basins than previously considered, thereby providing new data to revise paleohydrologic models for the region.

Session No. 310

[T173. From Peak to Playa, Saline to Fresh—The Great Diversity of Lakes \(Poster\)](#)

Wednesday, 22 October 2014: 9:00 AM-6:30 PM

Exhibition Hall C (Vancouver Convention Centre-West)

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