Merging lake and cave archives of past climate change in the U.S. Great Basin

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Ancient shorelines and lake sediments in Utah's Bonneville Basin preserve evidence of dramatic changes in water availability in the U.S. Great Basin over the last 30,000 years. In-depth study of these deposits has produced one of the best-constrained lake level records available; however, dating uncertainties still prevent confident assessment of linkages between Great Basin climate and global climate changes recorded in other archives. Further, there is a general lack of information about interglacial climates, when lake levels are low and few deposits are preserved.

Here we aim to address these problems using two complementary paleohydrologic archives that can be precisely dated by U/Th geochronology. First, we present hydrologic proxy data ($\delta^{18}O$, $^{234}U/^{238}U$, $^{87}Sr/^{86}Sr$, Ba/Ca) from pristine, crystalline lacustrine carbonates precipitated from Lake Bonneville's waters between 26 and 14 ka. Second, we present stalagmite Mg/Ca and $\delta^{13}C$ records from Lehman Cave on the Bonneville Basin's western edge that allow us to extend regional hydrologic records past the lake's deglacial fall through the Holocene. The precise chronological control and multiple hydrologic proxies offered by these paired records provide important new constraints on the region's response to a variety of climate forcings over the last 25 ka. We will focus particular attention on records of the region's response to Heinrich events 1 and 2 and the transition from relatively wet to dry conditions in the early Holocene.