

Orbital control of southwestern North America atmospheric circulation and climate over two glacial periods

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The Great Basin of western North America hosted expansive late Quaternary pluvial lakes, yet the climate forcings that sustained such large ice age hydrologic variations remain controversial. Here, we present a 175,000 year oxygen isotope paleoclimate record from precisely-dated vadose zone speleothems that document a previously unrecognized and highly sensitive link between Great Basin climate and orbital forcing. Our data match the phasing and amplitudes of 65°N summer insolation, including the classic saw-tooth pattern of global ice volume and on-time glacial to interglacial terminations, that resolves the long-standing controversy on the role of Milankovitch forcing of western North American climate. Because the expansion of pluvial lakes during the last glacial period was associated with cold glacial conditions, the reappearance of large lakes in the Great Basin is unlikely until ca. 55 ka into the future as climate remains in a mild non-glacial state over the next half eccentricity cycle.