

Western US precipitation changes over the last 25 ka: From the tropics or the poles?

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Cave and lake records from the U.S Great Basin provide evidence of substantial changes in water balance over the last 25,000 years. Here we present new U/Th-dated records of regional water balance from the Bonneville Basin in Utah and explore whether two prominent features of the records were primarily driven by changes in the tropical Pacific or instead by high latitude conditions.

First, these and other records document that the wettest conditions of the last 25 ka are associated with Heinrich Events, periods of anomalously cold sea surface temperatures in the North Atlantic Ocean and reductions in the strength of the Atlantic Meridional Overturning Circulation. What is the link between Heinrich Events and western US precipitation? Do wet conditions in the western US interior reflect a simple relationship between meridional temperature gradients and storm track position or intensity, or is the response mediated by changes in the tropical Pacific?

Second, a new stalagmite record documents relatively wet conditions in the early Holocene (~12-8 ka) followed by pronounced drying beginning at 8.2 ka. The relatively wet conditions of the early Holocene, though documented for over 60 years, are poorly explored and suggest that western US precipitation is not a simple function of high-latitude temperatures or orbital changes. Some records indicate maximum equatorial Pacific SSTs during the early Holocene, raising the possibility that relatively wet conditions at this time were driven from the tropics. Alternatively, the timing of this transition closely matches that of the collapse of the remnant Laurentide ice sheet over Hudson Bay at 8.2 ka, suggesting a link between this ice sheet and the western US storm track. We invite discussion of whether such a link is viable.