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775,000 years of climate history from the southwest USA: revamping the Devils Hole cave record

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The Devils Hole oxygen isotope record [1,2] has been a source of controversy for over 3 decades, as it conflicted with accepted global climate mechanisms tied to orbital forcing. A resolution to this controversy was proposed in 2016, when samples from the neighboring cave Devils Hole 2 (100m northeast from Devils Hole) corroborated with the accepted insolation-forced timing of glacial termination II and provided evidence for geochemical processes biasing the original Devils Hole chronologies [3]. Moving forward, we have extended the oxygen isotope record from Devils Hole 2 cave (DH2) to 775,000 years before present. 120 ^{230}Th-^{234}U ages and 10 independently-calculated ^{234}U-^{238}U ages form the basis of our extended DH2 chronology. In addition, evidence for a paleomagnetic reversal was discovered in DH2 samples at the onset of marine isotope stage (MIS) 19, as determined by stable isotope curve matching and ^{234}U-^{238}U ages, and thus corresponds in time to the Brunhes-Matuyama reversal. Oxygen isotope values derived from DH2 samples ($\delta^{18}O_{DH2}$) reveal hydroclimate changes in the southwest USA over the last eight glacial-interglacial cycles. Preliminary results show $\delta^{18}O_{DH2}$variations in close temporal agreement with 65°N summer insolation, including glacial terminations II to VII. Ongoing work on the $\delta^{18}O_{DH2}$ record aims to shed detailed insight into atmospheric circulation changes in the Northern Hemisphere mid-latitudes over the past 775,000 years.

[1] Winograd *et al.* (1988) *Science* **242** 1275–1280. [2] Winograd *et al.* (1992) *Science* **258** 255–260. [3] Moseley *et al.* (2016) *Science* **351** 165-168.