Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37088

California hydroclimate variability during termination 1: Insight from speleothem calcium isotopes

ELIZABETH M. GRIFFITH[1], CAMERON DE WET[2], ISABEL P MONTAÑEZ[3], JESSICA L. OSTER[4], ERICA A SCARPITTI[4], JOCELYN A CZIKO[3], LAKE WILLETT[2], SARAH PEDERZANI[5], GABRIEL BOWEN[5], ZHAO WANG[6], MICHAEL T HREN[6], CLAY TABOR[6] AND BARBARA E WORTHAM[7,8]

[1]The Ohio State University
[2]Middlebury College
[3]University of California, Davis
[4]Vanderbilt University
[5]University of Utah
[6]University of Connecticut
[7]PricewaterhouseCoopers
[8]UC Berkeley

While it is expected that precipitation varied in the past, producing robust records that document these changes is challenging but important, in particular in drought-prone regions. The last deglaciation in the western United States saw rapid hydroclimate changes impacting the ecology and perhaps wildfire activity in this semi-arid region [1,2]. Speleothems can provide highly resolved records over this time interval. Two well-studied speleothems – one from northern (Lake Shasta Caverns, LSC3) and one from central (McLean's Cave, ML1) California – were targeted to reconstruct hydroclimate variability during termination 1 using stable calcium isotopic ratios. Calcium isotope ratios in speleothems are thought to be controlled by prior calcite precipitation in the karst system and as such reflect variability in water balance in the cave, see [3]. The records are markedly different at the two locations. The northern California record suggests a generally wetter climate throughout Heinrich Stadial 1 (HS1 ~18 to 14.5ka) relative to the preceding glacial period, while the central California record shows more variable hydroclimate conditions. Connections to new fire- and plant-derived molecular biomarkers measured on some of the same samples will be explored to investigate how wildfire activity in California varied in step with changes in hydroclimate patterns during termination 1.

[1] Wortham, B.E. et al. (2022). Quaternary Science Reviews, 279, 107399.

[2] Oster, J.L. et al. (2023). Science Advances, 9, eadj2225.

[3] De Wet, C. et al. (2024). Geochemistry, Geophysics, Geosystems, 25 (10), e2024GC011691.