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Climatic backdrop to the terminal Pleistocene extinction of North American mammals

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North American terminal Pleistocene mammal extinctions are the subject of a long-running scientific debate. Although the role of climate has figured centrally, we lack clear knowledge of the timing and nature of terminal Pleistocene climate variability. Herein we document lengthy terminal Pleistocene drought in the southwestern United States (USA) using $\delta^{13}\text{C}$ and $\delta^{234}\text{U}$ effective moisture proxy data in speleothem calcite (stalagmite FS2) from Fort Stanton Cave, New Mexico, supplemented with age data from pool basin shelfstone speleothems from the Big Room in Carlsbad Cavern. This terminal Pleistocene drought, defined by a sharp rise in both $\delta^{13}\text{C}$ and $\delta^{234}\text{U}$ values, began just before 14.5 k.y. ago and lasted at least until 12.9 k.y. ago, when it was briefly and only mildly interrupted by the Younger Dryas. The timing and length of this drought (~1500 yr) match the Northern Hemisphere Bølling–Allerød oscillation preserved in Greenland ice cores and exhibited in the $\delta^{18}\text{O}$ record of stalagmite FS2. Rapid transition from cool moist Late Glacial to warm dry Holocene-like climatic conditions was likely unfavorable to many species of Pleistocene mammals in the southwestern USA. A climate-induced extinction implies that this last glacial cycle and its termination were more extreme than previous glacial cycles and/or glacial terminations.

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