

Title: Enamel isotopes reveal late Pleistocene ecosystem dynamics in southeastern North America

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Abstract

The end of the late Pleistocene (~10,000 years ago) witnessed the extinction of over seventy percent of North America's megafaunal genera. Although this pattern has been extensively investigated, its causal mechanisms remain elusive. Much of this difficulty is related to the spatial and temporal discontinuity of sites dating to the period leading up to the extinctions. Due to its removal from glacial conditions, southeastern North America provides a unique window into ecosystem dynamics just prior to human arrival in the region. In this study, we present new stable carbon and oxygen isotope data from *Mammuthus columbi* and *Bison latifrons* teeth collected from a well-dated Last Glacial Maximum (~20,000 rcybp) locality called Clark Quarry in coastal Georgia, USA. We compare these data to those from similarly aged (middle and late Rancholabrean) localities from Florida and demonstrate the presence of a vegetation gradient with elevated levels of C₃ vegetation at higher latitudes. We hypothesize that this pattern may have contributed to previously described migratory patterns of mastodon (*Mammut*) populations in southeastern North America. Serially-sampled $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values suggest that Clark Quarry *Mammuthus* and *Bison* changed their diet seasonally with the incorporation of elevated quantities of C₄ vegetation during warmer periods. Our data indicate more exaggerated seasonal dietary variability in these taxa at Clark Quarry relative to those collected from the interglacial locality of Waccasassa River in Florida, providing additional evidence for the significant influence of glacial dynamics in structuring North American ecosystems.