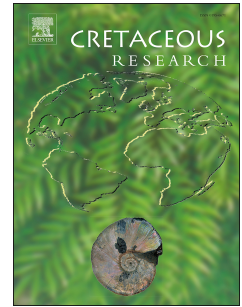


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Climate of the Late Cretaceous North American Gulf and Atlantic Coasts

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ABSTRACT

Understanding the response of temperature to elevated atmospheric CO₂ during past greenhouse intervals such as the Late Cretaceous can constrain hypotheses of expected future warming tied to the rise of modern atmospheric CO₂ levels. Here we present new reconstructions of Gulf and Atlantic Coast coastal marine temperatures through the Late Campanian (~76 – 72 Ma) and Maastrichtian (72 Ma – 66 Ma), as determined by carbonate clumped isotope analysis of marine bivalves and gastropods. We find temperatures in the range of ~7 – 25 °C across multiple sites located between 31°N and 36°N paleolatitude, and cooler temperatures of ~3 – 14 °C at sites around 39°N paleolatitude. Temperatures agree across a variety of taxa, indicating no appreciable organism-specific vital effects. The calculated paleotemperatures are very similar to modern marine temperatures at the same locations, despite the Late Cretaceous generally being considered a warmer interval. Clumped isotope temperatures are cooler than published temperatures from a nearby site measured using the TEX₈₆ paleotemperature proxy, revealing a potential warm bias in TEX₈₆ temperature estimates. The best agreement between clumped isotope and TEX₈₆ temperatures is achieved when using the TEX₈₆^L calibration over TEX₈₆^H or BAYSPAR calibrations.

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