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Climate of the Late Cretaceous North American Gulf and Atlantic Coasts

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1 Climate of the Late Cretaceous North American Gulf and Atlantic

2 Coasts

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8 **ABSTRACT**

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

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