Gulf Stream changes during the last interglacial inferred from cold Bermudian climate

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At 32° N, the warm sea surface temperatures (SSTs) around Bermuda today are the result of Gulf Stream influence [1]. Bermudian climate is thus highly sensitive to perturbations in North Atlantic ocean circulation and can serve as a proxy for Pleistocene ocean circulation changes.

We collected eight gastropod (*Cittarium pica*) shells from the Rocky Bay Formation, dating to the last interglacial (MIS5e), and two modern shells. Using the clumped isotope paleothermometer, we measured SST and water $\delta^{18}O$ values for all ten shells. The measured water compositions were combined with submonthly-resolution shell $\delta^{18}O$ analyses to calculate a high resolution record of Bermudian SST. Our results consistently indicate dramatically cooler SSTs with similar seasonality relative to today.

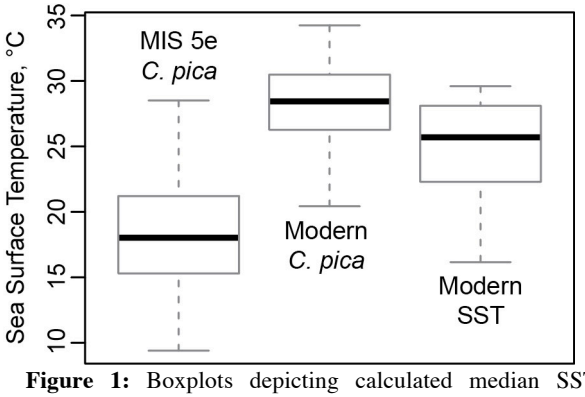

Figure 1: Boxplots depicting calculated median SST (black lines) along with modern annual SST data [2].

Although $\delta^{18}O$ is, on average, only ~0.5 ‰ heavier in fossil shells compared to modern, clumped-isotope-based SSTs are more than ten degrees colder. These data and the ecology of *C. pica* suggest a summertime bias in recorded temperatures, implying even colder mean annual SST for MIS 5e [3]. Such conditions are likely explained by changes in Gulf Stream position and/or weakening.

[1] Kuhnert *et al.* (2002) *Palaeo*^{3} **179** 159-171. [2] National Data Buoy Center (2015) *ndbc.noaa.gov* [3] Coates *et al.* (2003) *Int. and Comp. Bio* **43** 862-868.