NORTH ATLANTIC SEA SURFACE TEMPERATURES SINCE THE EARLY MIOCENE

JAMES R. SUPER[1], CHARLOTTE L. O'BRIEN[1], ELLEN THOMAS[1, 2], MATTHEW HUBER[3], MARK PAGANI[1], AND PINCELLI M. HULL[1]

[1]Department of Geology and Geophysics, Yale University, 210 Whitney Avenue, New Haven, Connecticut 06511, USA (*correspondence: james.super@yale.edu)

[2]Department of Earth and Environmental Sciences, Wesleyan University, 265 Church Street, Middletown, Connecticut 06459, USA

[3]Department of Earth, Atmospheric and Environmental Sciences, Purdue University, 50 Stadium Mall Drive, West Lafayette, Indiana 47907, USA

Ice-sheet expansion and deepwater cooling in the Neogene had profound consequences for the Earth system. Disentangling the influence of global fluctuations in CO_2 from regional changes in circulation and oceanic gateway connections is critical to understanding the drivers of the cooling. Evaluation of the timing and magnitude of sea surface temperature (SST) decreases in the North Atlantic toward modern values is difficult due to a lack of continuous low- or mid-latitude sea surface temperature (SST) records extending from the period of maximum Neogene warmth during the Miocene Climatic Optimum (MCO; ~17-14.5 Ma) through the cool upper Pliocene.

Here, we evaluate early Miocene through Pliocene ocean temperature evolution using paired measurements of the TEX_{86} and $U^{k'}_{37}$ paleothermometers from sediment cores in the high-latitude (ODP Site 982), mid-latitude (DSDP Site 608) North Atlantic, and Caribbean (ODP Site 999). MCO temperatures were elevated at each site, with TEX_{86} SST estimates of 27-24°C at Site 982, 31-28°C at Site 608 and 30-27°C at Site 999. During the Middle Miocene Climatic Transition (MMCT, ~14.5-12.5 Ma), SSTs cooled by ~6°C at Site 999 and Site 608, while cooling (~2°C) was muted at Site 982. This spatial variability suggests that changes in the position and strength of the North Atlantic Current during the MMCT may have reduced the SST gradient between Sites 982 and 608. Gradients increased with ~6°C of cooling at 7 Ma at Site 982, followed by decreases of ~3°C at Sites 608 and 999 between 6.5 and 5.5 Ma. Site 999 TEX_{86} data support reduced SST gradients between the Atlantic and eastern Pacific starting in the late Miocene, supporting the role the shoaling of the Central American Seaway may have had in changing Caribbean, and possibly North Atlantic, SSTs and circulation.

This abstract is too long to be accepted for publication. Please revise it so that it fits into the column on one page.