ABSTRACT

TITLE:	Millennial-Scale Climate Variability During Warm and Cold Periods of the Late-Pleistocene (~250-350 Ka) in the Subtropical North Atlantic
AUTHOR(S):	Rabideaux, Nathan
PRESENTED AT:	5th Annual Natural & Behavioral Sciences Undergraduate Research Symposium, Fort Lewis College

ABSTRACT: We use planktonic foraminiferal, Globigerinoides ruber, oxygen isotope analyses (18O) to complete a high resolution reconstruction of millennial-scale climate variability in sea surface hydrography during marine isotope stages (MIS) 8-10 (~250-350 ka) from Ocean Drilling Program Leg 172 Site 1056 on the Blake-Bahama Outer Ridge in the subtropical North Atlantic. We compared our record from Site 1056 to benthic carbon isotope (13C) records from subtropical Sites 1056 and 1063 and sub-polar Site 980. Overall trends in climate variability were similar between low-latitude and high-latitude Sites, but fluctuations were not as measurable in the sub-polar region as in the subtropical North Atlantic. During MIS 10, excursions toward 18O maxima are evident at Site 1056, which is most likely due to large ice volumes, with glacial Termination IV (~333 ka) being the most pronounced excursion at both sites. During MIS 9, our record approaches minima 18O values during the peak warm period, but is followed by repeated short-term excursions between high and low 18O values until reaching a sustained peak cold interval. The transitional interval of MIS 9 is marked by instabilities not associated with orbital forcing, which may be indicative of the role Northern Hemisphere ice sheet size, greenhouse gases and thermohaline circulation play in millennial-scale climate variability. MIS 8.5 is marked by a pronounced deviation from the cooling trend toward 18O-minima before returning to a cooling trend. Glacial Stage 8 is marked by an excursion toward maxima 18O values, signifying the onset of another glacial stage. This study suggests that the subtropical North Atlantic is more sensitive to millennial-scale changes than sub-polar regions in the North Atlantic. Links between 13C records from the subtropical and sub-polar North Atlantic, signifying enhanced North Atlantic Deep Water formation, were identified at four time intervals (~285, 295, 310, and 330 ka). The Vostok Ice Core displays that MIS 9 had high concentrations of CO2, which can impact climate variability. Millennial-scale climate variability was relatively small for most of interglacial MIS 9, though still displaying intervals of pronounced instabilities, lending some insight into short term climate change due to oceanic and atmospheric forcing.