Geophysical Research Abstracts
Vol. 19, EGU2017-12634, 2017
EGU General Assembly 2017

The Last Interglacial (MIS5e) cycle offshore the Little Bahama Bank: Large-scale ocean dynamics versus sea-level fluctuations

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Along the northwestern part of the Subtropical Gyre existing carbonate platforms can be considered an important link between the tropical and subpolar regions via the Gulf Stream. Here, we used the sediment record from the upper northern slope of Little Bahama Bank (460 m water depth) to decipher the variability of the Gulf Stream strength in the area of its origin during the penultimate deglaciation (T2) and the ensuing interglacial Marine Isotope Substage (MIS) 5e. The stratigraphy is based on the stable oxygen records derived from surface and thermocline planktic foraminifera as well as from bottom dwelling benthic foraminifera.

Isotopic data from planktic and benthic foraminifera as well as faunal and XRF-scan data clearly reveal a cooling event that punctuated the climatic amelioration during T2. Although the faunal sea surface temperature reconstructions based on planktic foraminiferal census data indicate relatively stable and warm conditions during MIS5e, high interglacial variability of the “mixed layer” species, dwelling in the upper 50-100 m underscore the existence of short-term climatic perturbations within the last warm period. Of particular note is a marked cold event subsequent to early MIS5e warming - as revealed from a significant decrease in shares of “mixed layer” species along with rapid positive excursions in d18O values of all measured foraminifera groups - and a clear two-fold structure of the last interglacial. Climatic variability during the first phase of the MIS5e goes along with significant variations in chemical composition of sediments (e.g. Sr counts normalized by Ca counts). These changes in sedimentary regime are attributed to the ongoing deglaciation of northern hemisphere ice sheets and associated post-glacial sea level rise. Accordingly, the stable conditions characterized by maximum bank-top flooding appear to have been postponed until the second phase of MIS5e and coincide with a stabilized phase in Sr/Ca ratios.