Atlantic Deep Ocean Circulation Across Ice Age Cycles; Site U1587 on the Iberian Margin

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The Atlantic Ocean is important for global climate and deep ocean circulation because it plays a vital role in Earth's climate system. Atlantic deep ocean circulation helps regulate temperature, support marine life and maintain atmospheric carbon dioxide levels in the atmosphere. The mid-Pleistocene transition (MPT) is recognized as a major climatic event that occurred about 700,000-1.25 million years ago. The MPT marks a shift in the Earth's glacial- interglacial cycles of 41,000 years to a longer periodicity of approximately 100,000 years. In this study, samples from sediment cores recovered by the International Ocean Discovery Program Expedition 397: Iberian Margin Paleoclimate at Site U1587 (37.58˚N, 10.36˚W, 3480 meters below sea level [mbsl]) on the Iberian margin were used to analyze Atlantic deep ocean circulation across ice age cycle before the mid-Pleistocene transition (MPT). Benthic foraminifera, including *Cibicidoides wuellerstorfi* and species of the genus *Uvigerina* were used as proxies due to being reliable recorders of deep-water properties, temperature and ice volume by reflecting the conditions of the surrounding water in which they lived. Different water masses exhibit distinct $\delta^{13}C$ signatures, and therefore the carbon isotope composition of foraminifera shells($\delta^{13}C$) values reflect these changes in the past. For this study we only use *C. wuellerstorfi* for $\delta^{13}C$ of foraminifera because they live at the sediment-water interface whereas *Uvigerina* live deeper in the mud. The oxygen isotope composition of foraminifera shells ($\delta^{18}O$) values also indicates global ice volume and local deep-water temperature. Our $\delta^{18}O$ results from approximately 1.04- 1.08 million years ago for Site U1587 were compared to the Lisiecki and Raymo, 2005 global benthic isotope stack and reflected changes in deep ocean circulation throughout the ice age cycle captured within this study interval. The changes in climate and deep ocean circulation reflected in the $\delta^{18}O$ and $\delta^{13}C$ isotopic analysis in benthic foraminiferal shells of our study provide insights into past climate dynamics, potentially improving our ability to understand and possibly even predict future climate changes.