



Centennial scale surface hydrology off Portugal during Marine Isotope Stage 3. Insights from planktonic foraminiferal fauna variability

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We have obtained a new foraminiferal faunal data set for core MD01-2444, 37 N, 10 W, 2600 meter water depth during marine isotope stage 3. We find that a group of species (*G. bulloides* + *G. glutinata*) used as proxy of upwelling intensity, possibly tracing the NAO intensity (through trade winds intensity changes) off Portugal parallels the rainfall index in the Caribbean as recorded at site ODP 1002 in the Cariaco basin and tracing changes of the ITCZ location. The driest intervals (ITZC to the south) at Site 1002 correspond to the driest intervals in MD01-2444 as well. Because an ITZC to the south is consistent to an ENSO+ situation, our study suggests a positive correlation between ENSO and NAO at a millennial time scale. During interstadial intervals when increased wetness over Cariaco is recorded (ITCZ to the north) and the upwelling in MD01-2444 is decreased we see from both SSTs and faunal tropical indicators that MD01-2444 site is warm, and through each so-called Bond cycle, the interstadials are equally warm. This contrasts with the GRIP record where interstadial peaks are successively cooler through each Bond Cycle. This record establishes a positive correlations between the tropical climate linked to the ITCZ position and impact on the MOC and the climate of southern Europe at millennial time scale, in spite of showing a very good correlation with polar latitudes (GRIP) through 18-O on *G. bulloides*. Therefore, our work points to changes in seasonality as a strong control over the climatic pattern of the North Atlantic area.