



Delayed response of South Atlantic deep waters to deglacial warming during Terminations V and I

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The work presented here is based on new data from deep-sea cores MD07-3077 and MD07-3076, collected in the Atlantic sector of the Southern Ocean (44°09'S, 14°13'W, 3770 m water depth). The high-resolution foraminiferal records, covering MIS12 to MIS10 and the last deglaciation, show a clear lag of the changes in deep water properties with respect to changes in surface conditions. The development of a chronology based on the correlation of Southern Ocean sea surface temperature with air temperature over Antarctica allows the quantification and comparison of phase lags within the marine records during Termination V (TV) and Termination I (TI), as well as the comparison with ice core records.

Comparison of our results with CLIMBER2 simulations indicates that deglacial changes in the South Atlantic can be interpreted as the response to changes in the state of the Atlantic meridional ocean circulation (AMOC). The early warming of South Atlantic surface waters and air temperature over Antarctica at the beginning of both TV and TI is attributable to a reduction in interhemispheric heat transport due to the weakening of the AMOC. The delayed response of bottom waters seen in the benthic records can be explained by the increased inflow of North Atlantic Deep Water (NADW) to the South Atlantic site at the time of the AMOC's recovery.

The sea surface temperature of this South Atlantic site exhibits a cold spell at the end of TV, resembling the Antarctic Cold Reversal of the last deglaciation. The presence of cold spells during both TV and TI may be explained by the fact that the recovery of the AMOC took place early during the termination. The sequence of events is similar during both terminations; however, the magnitude of the phase shifts between South Atlantic surface and deep waters conditions differ from one termination to the other, suggesting variations in the magnitude and duration of the perturbation of the AMOC.