THERMAL EVOLUTION OF THE WESTERN SOUTH ATLANTIC AND THE ADJACENT CONTINENT DURING TERMINATION 1

Chiessi, C.M.[1]; Mulitza, S.[2]; Mollenhauer, G.[2, 3]; Silva, J.B.[4]; Groeneveld, J.[2]; Prange, M.[2]
[1]School of Arts, Sciences and Humanities, University of São Paulo, São Paulo, Brazil; [2]MARUM-Center for Marine Environmental Sciences, University of Bremen, Bremen, Germany; [3]Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany; [4]Institute of Geosciences, University of São Paulo, São Paulo, Brazil

RESUMO: The thermal bipolar seesaw describes the warming occurring in the Southern Hemisphere due to diminished northward heat transport within the Atlantic Ocean when the Atlantic meridional overturning circulation is weakened. This mechanism is particularly efficient for perturbations of the Atlantic meridional overturning circulation through positive anomalous freshwater fluxes in the high latitudes of the North Atlantic. During Termination 1, millennial-scale weakening events of the Atlantic meridional overturning circulation (i.e., Heinrich Stadial 1, probably the best example for a freshwater-forced Atlantic meridional overturning circulation reduction, and the Younger Dryas) supposedly produced major changes in sea surface temperatures of the western South Atlantic and in mean air temperatures over southeastern South America. It has been suggested, for instance, that the Brazil Current would strengthen (weaken) and the North Brazil Current would weaken (strengthen) during slowdown (speed-up) events of the Atlantic meridional overturning circulation. This antiphase pattern was claimed to be a necessary response to the decreased North Atlantic heat piracy during periods of weak Atlantic meridional overturning circulation. However, the thermal evolution of the western South Atlantic and the adjacent continent is so far largely unknown. Here we address this issue, presenting high-temporal-resolution sea surface temperature and mean air temperature records from the Brazil Current and southeastern South America, respectively. We identify a warming in the western South Atlantic during Heinrich Stadial 1, which is followed first by a drop and then by increasing temperatures during the Bølling–Allerød, in phase with an existing sea surface temperature record from the North Brazil Current. Additionally, a similar sea surface temperature evolution is shown by a southernmost eastern South Atlantic record, suggesting a South Atlantic-wide pattern in sea surface temperature evolution during most of Termination 1. Over southeastern South America, our mean air temperature record shows a twostep increase during Termination 1, synchronous with atmospheric CO_2 rise (i.e., during the second half of Heinrich Stadial 1 and during the Younger Dryas), and lagging abrupt sea surface temperature changes by several thousand years. This delay corroborates the notion that the long duration of Heinrich Stadial 1 was fundamental in driving the Earth out of the last glacial.

PALAVRAS-CHAVE: LAST DEGLACIATION; PALEOCEANOGRAPHY; PALEOCLIMATOLOGY.