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Modes of response of the subsurface western South Atlantic to the last glacial Dansgaard-Oeschger cycles

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The last glacial was an interval characterized by a sequence of abrupt millennial-scale events well documented mainly from the Greenland and Antarctica ice-cores. Although the triggers are not fully understood, most of the works agree that they occurred in consonance with oscillations in the strength of the Atlantic Meridional Overturning Circulation (AMOC). Paleoceanographic reconstructions have shown that cold millennial-scale stadials were accompanied by high temperatures in the subsurface to intermediate waters of the Atlantic Ocean that may have acted in both the basal melting of ice-sheets and in the rapid atmospheric warming during the onset of warm interstadials. Assuming that recent transient models indicated an accentuated response of the subsurface western South Atlantic to the millennial-scale disturbances, here we present a paleoceanographic reconstruction in this area based on the deep-dwelling planktic foraminifer Globorotalia inflata. Our high-resolution oxygen isotope ($d^{18}O$) presents a sequence of millennial-scale variability that strongly resembles the structure of the Greenland Dansgaard-Oeschger cycles, mainly during Marine Isotope Stage (MIS) 5. On the other hand, during MIS 3, this millennial-scale feature is absent or weakly represented. Cross-spectral analyzes indicate a meaningful north-to-south forcing over the western South Atlantic subsurface during early-glacial. Mg/Ca-derived temperature and ice-volume free seawater $d^{18}O$ ($d^{18}O_{IVF-SW}$) executed for the MIS 5 interval demonstrated that the subsurface western South Atlantic was warmer and saltier (colder and fresher) during early glacial stadial (interstadials). We hypothesized that a wide reorganization of the northward heat transport throughout the last glacial occurred, in which regions so far south as 24 ºS worked as prominent heat reservoirs in periods of weakened AMOC during MIS 5 but not necessarily during MIS 3. Our data suggest that future impacts over the AMOC along the Brazilian margin will likely be recognized in the subsurface layers of the western South Atlantic.