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Changes in deep water circulation dynamics in the South Atlantic Ocean during Marine Isotope Stage 11

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Persistent deep-water formation in the North Atlantic and Southern Ocean is believed to drive the ventilation of the global deep ocean throughout late Pleistocene interglacial periods. The persistency of interglacial deep-ocean ventilation was, however, challenged based on reconstructed deep ocean deoxygenation events at Ocean Drilling Program (ODP) Site 1094 from the Antarctic Atlantic Ocean attributed to a perturbation in Antarctic Bottom water (AABW) formation during Marine Isotope Stage (MIS) 5e and 11. While a connection to instabilities of the West Antarctic Ice Sheet related to warming of Circumpolar Deep Water was postulated, the drivers and spatial extent of these 'AABW stagnation events' remain incompletely known. Here, we present new bottom water oxygen (BWO) reconstructions based on authigenic U enrichments in benthic foraminiferal coatings of *Uvigerina* spp. from Subantarctic Atlantic sediment core MD07-3077 (44.15°S, 14.23°E; 3770 m) for MIS 11 (424-374 ka before present). A combination of these BWO estimates with *Uvigerina* spp. Mg/Ca-derived bottom water temperature (BWT)- and $\delta^{18}O$-derived bottom water salinity (BWS) reconstructions at the same study site provides insights into the impact and mechanisms driving AABW stagnation events in the Atlantic Southern Ocean. Our results reveal predominantly well-oxygenated deep-water conditions in the Subantarctic Atlantic during MIS 11, with only one transient low-BWO event at 395 ka before present. This suggests that AABW stagnation events during MIS 11 were largely confined to the Antarctic Atlantic Ocean, indicating a limited northward expansion of poorly oxygenated water. Although this hints at a driver from the south, the variability in our reconstructed BWT and BWS records during the postulated MIS11 AABW stagnation events suggest various hydrographic settings that pinpoint mechanistic differences in the drivers among the bottom water deoxygenation events. Our new data provides crucial constraints on the (in)stability of climatic conditions in the Atlantic Southern Ocean, and by inference near the Antarctic ice sheet margin, during the warmer-than-present climate interval MIS 11.