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Changes in intermediate water circulation in the tropical North Atlantic during the Last Interglacial

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Recent evidence suggests that the warmer-than-present Last Interglacial (~129-116 ka before present) was characterized by an unstable Atlantic Meridional Overturning Circulation (AMOC), especially during its early phase associated with melting of the Greenland and Antarctica ice sheets. However, water mass geometry and circulation remain poorly constrained during this interval due to the lack of high-resolution marine records. Here we present a multi-proxy dataset of bottom water chemistry from the intermediate-depth western tropical North Atlantic (sediment core MD99-2198, 1330 m water depth), which provides evidence for changes in the southward spread of the Upper North Atlantic Deep Water (U-NADW). Our downcore bottom water e_{Nd} record obtained from foraminiferal coatings agrees with the e_{Nd} record extracted from bulk sediment leachates and is consistent with variations in benthic $d^{13}C$, whereas the detrital e_{Nd} values show a significantly different pattern. Despite indications of some exchange with the detrital sediment fraction, these observations support the application of the authigenic e_{Nd} signatures as a proxy for paleocirculation at our site. We find a major radiogenic e_{Nd} shift accompanying very light benthic $d^{13}C$ values during Heinrich Stadial 11 and the earliest phase of the Last Interglacial (i.e., until ~126 ka before present). This is attributed to a reduced advection of U-NADW characterized by a less radiogenic ε_{Nd} signature together with a possible admixture of Caribbean Sea waters with more radiogenic e_{Nd}. We discuss these results in the context of AMOC strength and variability in a warmer-than-present climate associated with high-latitude sea surface freshening.