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North Atlantic Deep Water reductions a persistent feature of the last five interglacial periods

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North Atlantic Deep Water (NADW) ventilation plays an important role in setting for example circum-Atlantic climate and the global ocean carbon inventory, raising concerns about its future evolution under North Atlantic buoyancy gain. Paleo-records suggest that the modern mode of vigorous NADW ventilation is relatively stable, with little variability during recent interglacial periods despite differences in background climate. That is, at least on the millennial timescales most proxy reconstructions have been able to resolve. On shorter, centennial timescales, little is known about interglacial NADW variability, despite this being the duration of the largest bottom water δ^{13}C and NADW reductions during both the current (e.g. Kleiven et al., 2008) and last interglacial periods (e.g. Galaasen et al., 2014).

We present centennially resolved *C. wuellerstorfi* δ^{18}O and δ^{13}C records from NW Atlantic IODP Site U1305 (57˚28.5'N, 48˚31.8'W; 3459 m w.d.) spanning MIS 7e, MIS 9e, and MIS 11c. Together with the subcentennially resolved bottom water δ^{13}C records spanning the Holocene (Kleiven et al., 2008) and MIS 5e from this location (Galaasen et al., 2014), our records provide a uniquely detailed characterization of the magnitude, frequency, and triggers of bottom water δ^{13}C and NADW distribution changes over the last five interglacial periods. In addition, we present new sub-centennially resolved IODP Site U1304 (53˚03.4'N, 33˚31.8'W; 3024 m w.d.) *C. wuellerstorfi* δ^{18}O and δ^{13}C records spanning MIS 5e.

Our results support that strong NADW ventilation is the baseline (millennial-scale) state generally preferred by the interglacial Atlantic. However, they also reveal that this state was perturbed under a range of interglacial background climates. Large, glacial-like reductions in bottom water δ^{13}C indicating reduced NADW influence in the deep North Atlantic mark all of the last five interglacials, albeit with distinct differences in their frequency, duration, and timing. Similar to MIS 1, only a single short-lived NADW reduction occurred during MIS 7e–but this time on the opposite end of the interglacial δ^{18}O plateau. MIS 11c shows persistent multi-centennial NADW variability spread across its duration, reminiscent of but more extreme than MIS 5e. Finally, NADW influence in the deep North Atlantic was curtailed for millennia during MIS 9e. We discuss potential triggers for interglacial NADW reductions and suggest a revision of the notion of interglacial stability.