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Intermediate water response to natural climate variability during the Holocene at the eastern boundary of the subtropical gyre (NW Africa)

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Decadal-to-millennial-scale climate variability during the Holocene is well documented in numerous paleoclimate records collected from both hemispheres. Nevertheless, our understanding of the forcing and mechanisms causing rapid climate events is still limited and a direct role of the thermohaline circulation for climate change during interglacials (i.e., the Holocene) has so far not been demonstrated. Off northwest Africa, sediment core GeoB6007-2 (30˚51'N, 10˚16'E at 900 m depth) is strategically located to record small changes in the production of Eastern North Atlantic Central Waters and main thermocline depth at the eastern boundary of the subtropical gyre. Thus GeoB6007-2 provides an ideal opportunity to record paleoceanographic variability of the intermediate branch of the Atlantic Meridional Overturning Circulation (AMOC) during the Holocene.

We present benthic foraminiferal oxygen ($\delta^{18}O_c$) and carbon ($\delta^{13}C$) isotopic records spanning the past 9500 years. Additionally, we present high-resolution intermediate water temperature and $\delta^{18}O_{seawater}$ (as a salinity proxy) reconstructions for time intervals during the early (8-9 ka), mid (4.5-5.5 ka) and late (0-1.2 ka) Holocene, using a newly developed Mg/Ca-temperature calibration for the benthic foraminifer *Hyalinea balthica*. Benthic foraminifera abundances are high throughout the core, yielding a sample resolution of 0.5 cm for stable isotopic reconstructions and 1 cm resolution for Mg/Ca based temperatures allowing a temporal resolution of 10-20 years over the past 9000 years. The Late Holocene temperature record indicates a steady cooling trend of over 1 ˚C from the end of the Medieval Warm Period (MWP) into the Little Ice Age (LIA) from ca. 9.2 ˚C to modern values of 8.2 ˚C. Superimposed on this trend is multi-decadal variability of ca. 0.3 ˚C co-varying with centennial-to-millennial variability in the stable isotopes and associated with known climate events of the late Holocene such as the 8.2 ka event, MWP and LIA. The new intermediate water records underscore the coupling between the natural variability of the AMOC on decadal-to-millennial timescales and northern hemisphere climate change.