



Deep Water properties in the North Atlantic's eastern and western basins during the Mid-Brunhes (330-630 ka)

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Changes in deep water stable isotope properties and current flow speed are revealed by centennial-scale benthic foraminifer and mean grain size $<63 \mu\text{m}$ records of IODP site U1313 (41°N, 32.96°W; 3412 mwd) from the western and core MD01-2446 (39.06°N, 12.62°W; 3570 m) from the eastern North Atlantic basin. At present the dominant influence at site U1313 is the Deep Western Boundary Current (DWBC) and at site MD01-2446 the Northeast Atlantic Deep Water (NEADW). During Marine Isotope Stage (MIS) 13 and 11, the interglacial isotope records at both sites show generally the same trend with relative stable conditions. MIS 11 stands out as the interglacial with least high-frequency variability in benthic carbon isotope values. During interglacial MIS 9.5, on the other hand, NEADW nutrient levels were highly variable. In times when the records diverge, oxygen and carbon values in the eastern basin are slightly lighter indicating that, like today, paleo-NEADW was modified by diapycnal mixing with lower deep water. Bottom current flow speed at 3500 m was low during the warm periods of MIS 9, 11 and 13 hinting to a vigorous overturning circulation and a deep N(E)ADW/ Antarctic Bottom Water (AABW) interface. Although DWBC physical properties show a similar range of variability during MIS 15 than during MIS 13.3, DWBC speed was as high as during glacial MIS 12, thus setting interglacial MIS 15 apart from the subsequent interglacials. Overall, there is a declining trend in DWBC speed from MIS 16 towards 13. During glacial inceptions current flow speed in both basins gradually increased and reached maximum values during glacial maxima contemporary with an increased AABW contribution to the benthic carbon isotope signal. During MIS 12, oxygen isotope values of site MD01-2446 were consistently lighter and between 445 and 433 ka its carbon isotope values became up to 0.75 permil heavier than those at site U1313. The better ventilation of the deeper eastern basin either points to a secondary, deep penetrating source of Glacial North Atlantic Intermediate Water, potentially in the Rockall Plateau region, and/ or a well ventilated overflow from the Norwegian Sea. The onsets of Terminations 7, 5, 4, and to a lesser extent 6, are marked by peaks in bottom current speed hinting to an increased density gradient in the deeper water column. During Termination V (around 426 ka), the decline of current speed is accompanied by an abrupt shift in isotopic levels from AABW to N(E)ADW values in both basins and thus the onset of the interglacial state of the Atlantic Meridional Overturning Circulation.