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Evolution of deep-water redox conditions in the NW African upwelling system during the last glacial and deglaciation: implications for the deep ocean circulation.

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We present a high-resolution geochemical reconstruction of deep-water redox conditions in the subtropical NE Atlantic Ocean, spanning from the Last Glacial Maximum into the early Holocene. Climate evolution and surface paleoceanographic conditions off NW Africa have been widely studied, yet little attention has been devoted to the reconstruction of deep-water circulation and its possible connection to surface water paleoceanography and paleoclimate. With this aim, the major and trace element contents were analyzed in sediments from the high-sedimentation record on core GeoB7926-2, recovered at 2500m water depth in the upwelling region off Mauritania. Redox sensitive elements (Mo, U, Mn) were used as paleo-redox proxies, and enabled the reconstruction of deep-water oxygenation. Based on these elements, two main phases of reduced oxygen availability are recognized: the second half of the Heinrich Event 1 and the Younger Dryas. Both periods are known as millennial-scale cold events during which the Atlantic Meridional Overturning Circulation (AMOC) slowed down or even collapsed. We speculate that such weakened circulation might have also induced restricted deep-water oxygenation affecting the upwelling region, thus promoting sub-oxic conditions and/or preferential preservation of organic matter off Mauritania. The mentioned oceanic circulation events, previously described for the Northern and Western Atlantic, are recorded for the first time in the NW African upwelling region. This reconstruction of the evolution of deep-water flow in the upwelling area off Mauritania support the collapse of the AMOC to have affected the NE Atlantic region as well and provides new evidence for oceanic scale circulation changes related to abrupt cold spells during the last deglaciation.