



Millennial-scale influence of southern intermediate component water into the North-east Atlantic during the last 40 kyr

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Throughout the last glacial-interglacial cycle major reorganisations of water masses in the North Atlantic occurred. Mediterranean Outflow Water (MOW) being an important source of saline and warm intermediate water has been modulated regarding its strength and mean depth. The Gulf of Cadiz near the Strait of Gibraltar is located in a region influenced by the 3 major temperate Atlantic mid-depth water masses: MOW, mid-depth subtropical gyre water and Antarctic Intermediate Water (AAIW). Those water masses are today characterized by contrasted Nd isotopic composition (ϵ_{Nd}): NACW $\epsilon_{\text{Nd}} = -11.9$; MOW $\epsilon_{\text{Nd}} = -9.4$; AAIW $\epsilon_{\text{Nd}} = -6$ to -7 . Here, we have investigated ϵ_{Nd} of seawater and cold-water corals (*L. pertusa*, *M. oculata* and *D. dianthus*) located to the Alboran Sea and to the SE of the Gulf of Cadiz (between 550 and 850 m) to constrain the present day seawater ϵ_{Nd} and to reconstruct the past water mass mixing, i.e. MOW variability during the last 37 kyr. Seawater ϵ_{Nd} values of ~ -11.6 indicate that the NACW is today the predominant water mass at the position of the coral bearing sediment core MD08-3231. Cold-water coral fragments have been $^{230}\text{Th}/\text{U}$ dated yielding ages of 4.5 to 37 kyr. The coral ϵ_{Nd} values range from -8 to -10.4 during the last 37 kyr, most likely indicating changes of the dominant water mass provenance. Glacial cold-water corals (from 19 to 37 kyr) are characterized by more radiogenic ϵ_{Nd} values (> -9.5) compared to the ones from the Holocene demonstrating a decreasing contribution of MOW and/or AAIW in the SE Gulf of Cadiz during climate warming. Strikingly, Heinrich events H2 and H3 reveal even more radiogenic ϵ_{Nd} values (~ -8). In addition, deep-sea corals from the Alboran Sea indicate that ϵ_{Nd} of the MOW do not change significantly through time. These results imply a higher contribution of AAIW at 500 m depth in the eastern temperate Atlantic. This first coral based paleo-seawater ϵ_{Nd} record for the Gulf of Cadiz thus points to significant advance of southern component water at shallow depth into the NE Atlantic potentially even into the Mediterranean sea that needs to be further investigated.