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On the evolution of Mediterranean Sea Water during climate warm stages (MIS 1, 5, 7)

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The Nd isotopic composition of the aragonite skeleton of fossil reef framework forming cold-water corals provides a way to reconstruct the provenance of water masses bathing the reefs (e.g., Copard et al., 2010; van de Flierdt et al., 2010; Colin et al., 2010). Here, we have reconstructed the Nd-isotopic composition of corals on two sites along the eastern north Atlantic, the Gulf of Cadiz (off Morocco) to the south and the Porcupine Seabight (Belgica Mound Province) to the north. A stunting evolution of the northward propagation of Mediterranean Sea Water (MSW) came to light for the past three climate warm stages (Marine Isotope Stages –MIS– 1, 5, 7). In fact, water masses in the Gulf of Cadiz reveal rather constant Nd-isotopic composition (εNd $\sim$ -9 to -11) during climate warm stages similar to present day MSW (εNd $\sim$ -9.4 to -11). In contrast, corals from Porcupine Seabight reveal dramatic changes over the past three climatic warm stages. During stage MIS 7 the isotopic composition of water masses in Porcupine Seabight is identical to the one of the Gulf of Cadiz, most likely reflecting a strong northward export of MSW. In contrast, during MIS 5 and 1 a large contrast between southern (εNd $\sim$ -9 to -11) and northern reefs is found ($\Delta\varepsilon$ND = -3 to -4) indicating largely reduced northward flow of MSW compared to MIS 7. This difference is likely related to a far stronger eastward export of intermediate water from the subpolar gyre during the past two climatic warm stages.

References:

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