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Poster

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Late Quaternary Mediterranean Outflow Water: Implications from radiogenic Nd, Sr, Pb isotopes and clay

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Abstract:

Mediterranean Outflow Water (MOW) is characterised by higher temperatures and salinities than other ambient water masses. MOW spreads at water depths between 500 and 1500 m into the eastern North Atlantic and has been a source of salinity for the Atlantic Meridional Overturning Circulation. We used high-resolution Nd and Pb isotope records of past ambient seawater obtained from authigenic ferromanganese coatings of sediments in three gravity cores at 577, 1745 and 1974 m water depths in the Gulf of Cadiz and along the Portuguese margin complemented by a selection of surface sediments to reconstruct the extent and pathways of MOW over the past 23 000 years. In addition, radiogenic Nd, Pb and Sr isotope ratios obtained from total digestion of the residual clay fraction of the leached samples were used to evaluate any changes in the endmember compositions. The surface and downcore seawater Nd isotope data from all water depths exhibit only a very small variability close to the present day composition of MOW but do not reflect the present day Nd isotopic stratification of the water column as determined from a nearby open ocean hydrographic station, which is most likely the consequence of downslope sediment transport in the nepheloid boundary layer as well as the small variations in the Nd endmember compositions. In contrast, the seawater Pb isotope records show significant and systematic variations, which provide evidence for a significantly different pattern of the MOW pathways between 20 000 and 12 000 years ago compared with the subsequent period of time. A deeper situated MOW during the Last Glacial Maximum (LGM) raised during the early deglaciation with its shallowest position around Heinrich event H1, followed by a moderate deepening and the establishment of present-day MOW hydrography. The radiogenic isotope signatures of the residual clay fractions document a pulse of sediment input from the north during Heinrich event H1 around 14.8 ka, but other than that exhibit little varibility over time suggesting surprisingly constant sedimentary endmember compositions and mixing ratios since the LGM.

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DE: [4283] OCEANOGRAPHY: GENERAL / Water masses

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