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The last deglaciation in the SW Iberian margin: changes in the Atlantic surface and Mediterranean bottom waters

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The dominant arid climate conditions over the Mediterranean (Med) control water properties and the formation processes of intermediate and deep water masses. Deep convection cells occur in both the E- and W-Med basins and there are interconnected through the intermediate waters mostly formed in the easternmost area of the Med. During last deglaciation and Holocene periods both E- and W-Med had experienced periods of major disruptions in deep convection. The last organic layer (ORL1) formed in the W-Med during the deglacial period and later the last sapropel (S1) in the E-Med. Both enhanced productivity and enhanced stratification are regarded as the causes for the two events but responding to different drivers, the deglacial freshening in the case of the ORL1 and the African monsoon flooding for the S1.

Here we present U/Mn ratios measured in the foraminifera diagenetic coatings from sediment cores from both E- and W-Med. The nature of this proxy, sensitive to oxygen water content, allows its application in a wide range of oceanographical/oxygen conditions, a situation that compromises other proxies whose carrier is limited by the changes in oxygen content. This approach allows us, by the first time, to compare the oxygen evolution of individual basins and at different water depths by means of the same tool. The obtained results indicate the deglacial development of an intense minimum oxygen zone in the W-Med associated to the LIW which extended down to at least 950m in association with the ORL1 formation, highlighting that the E-Med could also had had an important role in the development of this ORL1. During the Younger Dryas a re-ventilation process of the W-Med interior started at around 900m and evolved upwards and downwards to fully develop at shallower and deepest depths (300 and 1840 m respectively) at the onset of the S1 in the E-Med. Changes in the thermohaline system of the E and W-Med were closely related but with opposite sign in their response during critical events such as the S1.