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The Mediterranean Water content in the Northeast Atlantic

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Distribution of the Mediterranean Water (MW) in the subtropical Northeast Atlantic [20–50o N, 5–40o W] was studied using Optimum Multiparameter analysis (OMP) applied to the World Ocean Atlas (http://www.nodc.noaa.gov/) and MEDTRANS climatologies (http://co.fc.ul.pt/en/).
The areas of influence of water masses in the study region were obtained from literature and from analysis of individual TS-diagrams. The analysis permitted to divide the water column between 500 to 2000 m into 5 vertical layers. The boundaries of the layers separated different expected sets of the dominant water masses; their depth varied across the study region. For the OMP we used the following water masses: the central fraction of the North Atlantic Central Water (H), the lower fraction of the North Atlantic Central Water (NACWl), the Mediterranean Water (MW), the Sub-Artic Intermediate Water (SAIW), the modified Antarctic Intermediate Water (AA), the Labrador Sea Water (LSW) and the upper fraction of the North Atlantic Deep Water (NADWu). The characteristics of the water masses were obtained from Perez et al. (2001), Alvarez et al. (2004) and Barbero et al. (2010), taken at the places where the water masses entered the study region. For each of the layers and each of the grid-points OMP was applied for estimation of the percentage of the each of the water masses in the observed mixture. The analysis of sensitivity of the results to the definition of water mass proprieties showed that their percentages were derived within the average error of 10%. The percentages of water masses obtained in this study compared well with the previous OMP results at some individual sections across our region (Hinrichsen and Tomczak, 1993; Alvarez et al., 2004 and Barbero et al., 2010).
In this work we specifically focused on distribution of the MW. The results showed that the MW reached its maximum of 50% at 1200 m depth in the Gulf of Cadiz. The percentage decreased to about 40% along the Iberian continental slope, and further gradually decreased to the west and to the south. To the west it reached about 10% at 35-40º W, over the subptropical section of the Mid-Atlantic ridge, and to the south it totally disappeared around 25o N, south of the Canary islands. Following the values of the maximum percentage of the MW, we got that at 700 m depth its preferred path was to the north along the Iberian continental margin and further on, reaching 24% at 45 – 50o N. At 900- 1300 m depth the MW preferably moved west and west-south-west. Below 1500 m level the MW still had a significant percentage and moved south-west.