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Mediterranean Outflow Water in the eastern Gulf of Cadiz: pathways and intrannual variability.

María Jesús Bellanco Esteban* & Ricardo F. Sánchez Leal**

Spanish Institute of Oceanography (IEO). Cádiz (Spain).
* mjbellanco@cd.ieo.es. **rleal@cd.ieo.es

On its pathway towards the Atlantic basin, the Mediterranean Outflow Water (MOW) is subjected to the abrupt and complex seafloor topography of the Gulf of Cadiz. MOW overflows the Strait of Gibraltar at a sill depth of 350 m as a dense, salty, bottom-trapped gravity current. Initially an undercurrent to the Eastern North Atlantic Central Water (ENACW), it is seen to reach Cape St. Vincent as a multi-layered, buoyant plume at depths ranging 800-1300 m.

This work presents the bottom hydrography in the eastern Gulf of Cadiz based on historical near-bottom CTD observations (2005-2013) combined with a repeated series (2007-2013) of high-resolution CTD-LADCP observations along a number of standard sections crossing the early MOW.

The water column in the study area is occupied by Surface Waters (SW) in the first meters, a local flavor of ENACW underneath, and MOW close to the bottom. In the horizontal, these three layers occupy well-defined depth intervals: (i) a shallower zone (<60 m) occupied by surface waters; (ii) an intermediate zone between 100 and 250 m depth occupied by ENACW; and (iii) the deeper grounds featuring the domain of a number of MOW varieties. This MOW domain exhibits three main depth-dependent sub-zones: (1) a Shallow Core (SC) domain between 250 and 350 m depth; (2) a Upper Core (UC) domain between 350-500 m depth and (3) Lower Core (LC) domain below 800 m.

With regards to the intrannual variability, MOW exhibits a warming and salinification in winter throughout most of the grounds deeper than 250 m as compared with early autumn. This suggests an elevation or onshore push of the MOW area of influence towards the upper slope with respect to early autumn situation.

These data give insight on the spatial distribution and intrannual variability of thermohaline and cinematic properties of near-bottom flows, with special emphasis on MOW pathways and their attachment to bathymetric features. In particular, observations show MOW branches diverting or merging the main path as a function of the orientation of channels and valleys.

This results may help understand the spatial distribution of certain benthic species (i.e., habitats of sesile and vagile species), as well as to unravel the mechanisms driving the seasonal timing and main features of their life-history traits, strategies and tactics.

References

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