



## **On the selection of a reference level depth for geostrophic calculations in the Gulf of Cadiz (SW Iberia)**

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In this work, some of the previous reference surfaces used in the literature for geostrophic calculations in the Gulf of Cadiz are revised and a technique based on the maximisation of the inflow to the Strait of Gibraltar is proposed. The results of this selection in comparison with the others are shown using in situ data collected in the GOLFO 2001 survey.

An adequate reference level, which would be an (intuitively) motionless surface, should be the interface separating NACW from MW, at least in the vicinity of the Strait of Gibraltar, where MW is found at shallower depths. Since the flows have opposite directions, in this hypothetical interface the velocity will be near zero. Such particular reference level has to maximise the inflow to the Strait of Gibraltar and the condition of maximisation determines, in turn, the depth of the “best” reference level. In addition, this level would gather conditions to be considered a motionless surface

To this aim, the geostrophic volume transport towards the Strait of Gibraltar has been computed for different choices of the reference level depth. The isolines of geostrophic transport have been plotted starting from the zero value, which has been selected as the closest-to-shore isoline that crosses the full domain from west to east. From these plots, the transport towards the Strait has been computed. The maximum was reached for a reference level depth around 300m, thus selecting the reference surface at this depth. With this selection, the estimated transport to the Strait was 0.8 Sv, in good agreement with the values provided by the literature. The imposition of this additional maximisation condition to the inflow towards the Strait is, to a certain extent, a

technique comparable with inverse methods. Anyway, the technique has some weak points, to which some attention is devoted in the work.