



## **Analysing the tidal dynamics of the interfacial layer in the Strait of Gibraltar and its biological implications**

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The origin of a tidally-modulated inflow of Mediterranean-Atlantic mixed water through the Strait of Gibraltar is investigated with a three-dimensional numerical model. Several previous work have noted the biological relevance of this rich-nutrient flow as it can enters the photic zone, making possible primary production. It is found that this mixed water is mainly formed at the sill areas of Gibraltar (western part of the Strait) as a result of strong diapycnal mixing occurring through a series of internal hydraulic jumps. A passive-tracer experiment reveals that subsequently, as the tidal flow reverses, a fraction of this water (up to 20%-40% of its mass) is entrained by the Atlantic surface layer towards the Alboran Sea. We also conclude that propagating internal waves in Gibraltar play a marginal role in the production of Mediterranean-Atlantic mixed water against the former mechanism, but they certainly can facilitate its local upwelling through their strong vertical orbital velocity. This study makes clear the complex tidal dynamics of Gibraltar, fundamental to understand the exchange flows and evaluate the biochemical budget of the connected basins.