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[Effect of circulation at early life stages of European anchovy in the Bay of Biscay from observational data and a Lagrangian approach](#)

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Abstract: Coastal circulation influences the distribution of European anchovy (*Engraulis encrasicolus*) at early life stages (ELS) in the Bay of Biscay (BoB). However, how this happens is not yet fully understood. In this work, further insight is provided by performing Lagrangian diagnostics based on observations of ELS anchovies' initial distributions and currents. Surface diagnostics were obtained by using high-frequency radar (HFR) currents and were applied to analyse multiyear variability and detect the coastal processes that affect the distribution. Since ELS anchovies are also located at subsurface levels, subsurface diagnostics were obtained by using currents reconstructed from HFR and ADCP observations with a reduced order optimal interpolation (ROOI) method. The analyses included transport computations as well as the analysis of flow properties by Lagrangian Coherent Structures and chlorophyll-a satellite images. Results suggest that ELS anchovies are mostly retained over the shelf and slope, and that transport patterns highly vary across different periods. Mesoscale structures such as eddies, fronts and along-slope currents within the slope and the Capbreton canyon area, as well as strong and persistent winds, could significantly impact the distribution of ELS anchovies. In some periods, the resulting distribution might be due to a combination of these processes. Circulation can also play a key role in ELS anchovy aggregation within short time scales (20 days). This work showcases the potential of observation-based approaches and emphasizes the relevance of coastal observatories for integrated studies.

Keywords: Lagrangian diagnostics, Coastal circulation, Transport processes, Fish larvae, HF radar, Multiplatform observations, 3D data reconstruction, Lagrangian Coherent Structures, Bay of Biscay