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The Azores Current, from Madeira to the Gulf of Cadiz

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The Azores current is thought to be a zonal jet which originates as a branch of the Gulf Stream, crosses the Mid-Atlantic Ridge south of Azores and flows eastwards until reaching the Gulf of Cadiz. Recent observational and theoretical studies indicate that this current undergoes very little seasonal variations, maintains a transport of $3-4$ Sv at its eastern end and has a counter-current at north. Such observations suggest that the current can be forced by Mediterranean Overflow and beta-plume models have shown that the entrainment of Mediterranean Water in the Atlantic may induce large-scale circulation structures which could explain the aforementioned observations.

We have been analysing Absolute Dynamic Topography (ADT) maps as well as time series of Sea Level Anomaly (SLA) maps in the region between 10^oE–40^oW and 30^oN–40^oN. Preliminary results from ADT provide weak observational support for the presence of a beta-plume induced circulation cell in the Gulf of Cadiz, while a ~ 15 yrs mean SLA map reveals a coherent wavemode pattern along the 34^o N parallel. To better understand the dynamics of the Azores current, we have also been studying the mesoscale activity in this region using *in situ* data (SVP). Our records show that eddies in this region have an average period of 16 days and diameters around 70 km. The eddy centre propagation speeds are ~ 2 cm s^{-1}, whereas swirl velocities are in the range $6-40$ cm s^{-1} with corresponding EKE of $20-900$ cm^2 s^{-2}. In general, the eddies tend to move westwards and can remain coherent for as long as ~ 200 days while travelling distances up to ~ 500 km. Furthermore, when going from northern to southern latitudes it was observed a decrease (increase) in the number of anticyclones (cyclones) – an asymmetry that is in agreement with results from previous theoretical studies which are able to explain the observed mesoscale features assuming that the Azores Front is baroclinically unstable.