



Mesoscale eddies in the Algerian Basin: formation, translational and energetic characteristics as obtained from 22 years of altimetric satellite data

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The formation and propagation of mesoscale structures in the Algerian Basin strongly influence the circulation of the Western Mediterranean Sea and have been subject to several studies in the past. In order to investigate the spatial and temporal distribution of the anticyclones and their pathways within the basin, we applied an automated detection and tracking method to 22 years of Sea Level Anomaly (SLA) data. The algorithm is based on the computation of the Okubo-Weiss parameter in SLA closed loops.

The results show two different types of anticyclonic eddies depending of the area of formation. Most of the eddies occurring above 39° N and along the North Balearic Front (NBF), have lifespans shorter than 3 months. They are supposed to be caused by the instabilities of the thermal front and are thus labelled Frontal Anticyclonic Eddies (FAEs). These short-life structures form mainly in fall and winter and are characterized by low translational velocity and a highly variable direction of propagation. By contrast, the eddies in the southern part of the basin (the Algerian Eddies - AEs), originate along the Algerian Current as a consequence of baroclinic instabilities and on the whole have lifetimes greater than 3 months. They are also the largest and the most energetic structures of the area. The peak of formation is observed in spring, when the transport of the Algerian Current is maximum. These features form mainly east of 6.5° E and move eastward along the African slope to the Sardinia Channel, where they detach from the coast and continue offshore following a cyclonic closed pathway corresponding to the intermediate circulation. In the southern part of the basin we also detect a convergence area where the eddies tend to merge.

Lastly, the analysis suggests that the Algerian Basin can be separated into a southern and a northern part as a function of the properties of the eddies, such as formation site, path, number, energy and lifetime. The only connection in terms of eddy tracks between the two areas is represented by a few long-life FAEs moving southward and becoming entrapped by the southern cyclonic circulation.