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The analytical model of McCartney applied in the eastern Levantine basin: formation of the Cyprus eddy and associated sub-basin and mesoscale features

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The circulation in the Levantine Eastern Mediterranean basin is characterized by a complex system of sub-basin and mesoscale features. The most predominant and persistent eddy is an anticyclonic feature located south of Cyprus and identified as the Cyprus Eddy (CE). Previous studies based on in-situ data, satellite and model outputs confirm the presence of this warm core eddy centered around 33°E, 33.5°N. Although the center of the CE might be found slightly shifted to the west /east for different years of analysis, the anticyclonic eddy appears always above the Eratosthenes seamount whose peak lies at the depth of ~ 690 m and it rises ~ 2500 m above the surrounding seafloor. The presence of a cyclonic and anticyclonic eddy named South Shikmona (SSE) and North Shikmona (NSE) eddy, respectively has been also detected east of the CE and west of the Lebanese and Israeli coasts. Here, we present a hypothesis that attempts to explain the formation mechanism of the three eddies described above. Specifically, for an eastward stratified current on a b plane, the isolated seamount forces a Taylor column above it which can be identified as the CE. A standing wake downstream is also formed, and embedded eddies are associated with the SSE and NSE. These sub-basin features are probably part of a Rossby wave system. The analytical model of McCartney 1976 supports this hypothesis. Reanalysis and sea glider data collected during the CINEL project sponsored by the U.S. Office of Naval Research (ONR) are used to investigate McCartney's solution. Preliminary results confirm the presence of a series of eddies above and downstream the sea mountain supporting therefore, the advanced hypothesis.

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