

GENERATION OF SHIKMONA ANTICYCLONIC EDDY FROM AN ALONGSHORE CURRENT

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Abstract

During the summer of 2009, 6 Lagrangian drifters were launched in the South eastern Levantine basin, 3 of them near the Israeli coast. The drifters moved northward along the shelf and turned toward the deep sea off Haifa Bay. One of the drifters was trapped in a stationary meander for a week, later it moved in a trajectory that is interpreted as a detachment of the meander to an anticyclonic eddy. This eddy moved, within 4 days, northwest to a location where the Shikmona eddy was previously observed. Over the next 30 days the drifter demonstrated a stationary eddy position and then exited the eddy area. Satellite observations of high chlorophyll-a (Chl-a) concentration correspond to the geographical position of the meander and the eddy. Operational model forecasts in the area fail to generate the observed phenomena.

Keywords: *Levantine Basin, Circulation*

The south eastern circulation in the Levantine basin is generally characterized by a large scale cyclonic circulation. Development of a north bound jet current along the eastern continental slope is frequently observed [1]. Another energetic feature of the circulation is the anticyclonic Shikmona eddy observed generally in the vicinity of 33.8°N, 33.8°E [2]. The formation of the Shikmona eddy was attributed either to meandering of the Mid Mediterranean Jet in connection to dynamic instability near the Eratosthenes Seamount [3] or to meandering of the alongshore current [4]. The later mechanism was derived from SST analysis without in situ confirmation.

NEMED is an observational program, led by OGS [5], to quantify the circulation and eddy variability in the Eastern Mediterranean, with major attention to the eastern and northern regions of the Levantine sub-basin, using among others, low-cost satellite-tracked drifters in the vicinity of Cyprus and Israel. The first series of SVP drifters included 3 drifters which were launched on the Israeli continental slope near Ashdod by IOLR and 3 drifters which were launched on the line connecting Limasol and Port Said by the University of Cyprus. The continental slope drifters were carried north by the alongslope jet current with an estimated velocity of 20-30 cm/s. Their trajectories deviated westward south of Haifa Bay. Two drifters outlined a meander reaching about 70 km west of the shore and continued along the Lebanese and Syrian coast (Fig 1a). The third drifter was trapped in the meander for a week and then travelled, within 4 days, northwest in a spiraling trajectory (Fig 1b). Afterwards it outlined the Shikmona anticyclonic eddy centered at 34.2°E, 33.6°N with diameter of about 50 km and remained there for 30 days (Fig 1c). One of the drifters launched south of Cyprus was also trapped by the eddy in a larger orbit (80 km diameter) for two weeks.

the eddy, corresponding to the trajectory of the trapped drifter in time and space. During the 30 day period Chl-a concentration gradually decreased until it was no longer discernable, around this time the drifter exited the eddy area. SST maps, unlike Chl-a, showed only a weak signal of the eddy. Model forecast from the same period run by IOLR did not reproduce the phenomena described above and showed the alongshore jet with no meandering.

References

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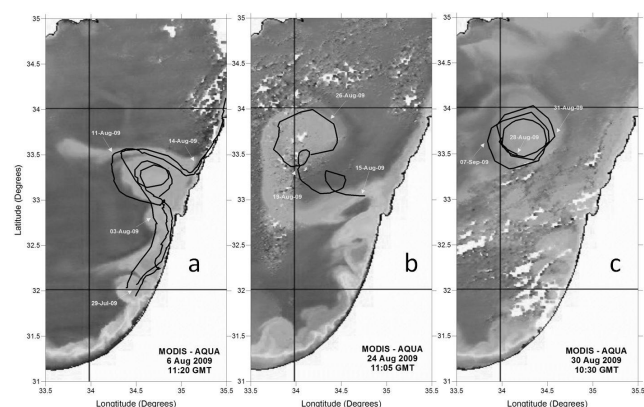


Fig. 1. Stages in the evolution of Shikmona Eddy from meander. Lines: Lagrangian drifters trajectories. Background: concentration of Chl-a (lighter shades represent higher concentrations).

Remote satellite observation of Chl-a provided by CYCOFOS [6] showed local concentration maximum in the center of the meander and later in the center of