



Eastern Mediterranean Surface Circulation: Insights from Analyzing 14 Years of Satellite Altimetry Data

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The surface circulation in the Levantine basin of the Eastern Mediterranean (EM) is a complex multi scale system, characterized by areas of strong eddy activity. The nature of this mesoscale circulation is under debate. While one approach considers the circulation as composed of several distinct "building block" eddies which can be permanent, recurrent, or propagating, an alternative approach considers the mesoscale flow as turbulent, with mesoscale sub-regions characterized by the amount of the eddy activity accumulated there. Both approaches indicate that there is more mesoscale activity in the Levantine basin than in the other Mediterranean basins, which probably attribute to its complexity.

The main goal of this research is to provide observational view on the Levantine Basin surface circulation and by that allowing characterization and quantification of spatio-temporal variability patterns at the mesoscale. This is done by applying various statistical methods (FFT, Hovmoller diagrams, EOF analysis), over a 14 years (1993-2006) of satellite derived sea level anomalies (SLA) obtained from the Aviso project (<http://www.aviso.oceanobs.com>). The SLA data have a 7 days, 1/8 degree resolution, and are based on measurements from several altimeter missions (Jason-1, Topex/Poseidon, ENVISAT, GFO, ERS1/2 and GEOSAT)

Our results show that the mesoscale circulation is characterized by significant spatial and temporal variability. Furthermore, the nature of the mesoscale circulation changes dramatically between different geographical sub-regions. The most prominent mesoscale feature is found southeast of Crete, and is associated with the Ierapetra eddy. This mesoscale structure is remarkably stationary and shows a distinct energetic signature throughout the whole period. Variations in the intensity of the Ierapetra eddy are found to be associated with changes wind stress over Crete Island. Contrary to that, other "building block" eddies, as the anticyclone Marsha Matruch, in the southern part of the basin, the cyclonic Rhodes gyre, which is an area of dense water formation, and the Shikmona anticyclone, near the northern coast of Israel, are found to have an episodic nature. In these areas we do not find evidence to distinct coherent structures and eddies (both cyclonic and anti-cyclonic) appear intermittently.