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Velocity Structure of an Anticyclonic Eddy in the NW Black Sea as Derived from Surface Drifters Trajectories

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ARGOS surface drifters are a valuable source of information of currents in the upper mixed layer of the ocean. They proved particularly useful in the study of mesoscale vortices due to their capability to provide snapshots of velocity fields. A set of 6 SVP-B drifters was deployed in May 2004 during BSERP-3 cruise onboard R/V Akademik (Bulgaria) as part of the field phase of the Black sea Ecosystem Recovery Project. A drifter consists of a sphere of 41 cm in diameter and a large drogue centred at 15 m depth. The drifters have been arranged as a cluster of 4 units and a string of 3 units at a transect across an anticyclonic eddy at approximately 44°13' N, 31°17'E. One of the drifters has been part of the cluster and, at the same time, part of the string. The centre of the eddy was provisionally identified from the Sea Surface Temperature (SST) imagery and then located more precisely from a CTD survey, with stations organized as "butterfly wing" pattern. According to this method, the deepest location of the thermocline was first identified on a swift "trial" transect, and then the second transect was made in the perpendicular direction. Drifters provided information on SST , atmospheric pressure and their own coordinates. Analysis of drifter trajectories revealed that the anticyclonic eddy kept its coherent structure for about 25 days while being advected by the Rim current and after 9 June the eddy broke apart. The analysis included separation of drifter trajectories into movement of the eddy centre and the orbital motion. The centre of the eddy moved with variable velocities in the range of 2.6 km per day on 15 May to 15.3 km per day on 27 May with the mean translation speed of ˜11cm/s. The eddy was a slightly elongated in the zonal direction. The size of the eddy as determined from satellite images was approximately twice as large. Our high resolution observation showed a complex structure of velocity field in the central

part of the eddy and did not support a commonly used assumption that the central part of an anticyclonic eddy is in a state of “solid body” rotation.