Abstract View

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Currents, Water Masses, Eddies and Jets in the Mediterranean Levantine Basin

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ABSTRACT

Hydrographic measurements in the southeastern Levantine basin are analyzed, and the climatological water masses of the region and their seasonal variations are identified. We observe the formation of the salty and warm Levantine Surface Water Layer (LSW); we characterize the subsurface Atlantic Water Layer (AW); and we describe the properties of the thermocline waters, called Levantine Intermediate Waters (LIW). The baroclinic dynamical modes are computed for the climatological stratification parameters. The empirical orthogonal function (EOF) analysis of the vertical shear profiles shows that considerable energy is contained in the second EOF at the thermocline and deep levels. Maps of the baroclinic streamfunction field referred to 700 meters are displayed: 16 instantaneous flow field realizations show an intense mesoscale eddy file never revealed before in the region. The space scales of the eddies are about 100 km and a smaller scale (60–70 km) variability is also evident. The eddies are present, e.g., stationary for over a season, and there are periods in which only a single eddy center is present embedded in an almost quiescent flow. The velocities in the strong jets at the border of the eddies are of the order of 20–40 cm $^{-1}$ at the upper thermocline levels. The water mass analysis of this eddy field shows that the AW and LIW salinity properties are distributed in filaments and patches: the maximum salinity cores of LIW are trapped in the anticyclones found in the region. An event of salinity ventilation (down to 200 m) is described that seems to involve the homogenization of the salinity properties but not convective mixing of the density structure. The traditional picture of the basin currents is compared with the mesoscale flow analyzed here, and we speculate upon possible mechanisms of water mass transport.

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