POTENTIAL VORTICITY EVOLUTION OF DENSE WATER VEINS ALONG THE STRAITS OF SARDINIA AND SICILY

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Over the past few years, intense experimental investigation based on long-term series of hydrographic and current data in fixed stations has allowed the water masses flowing into the Central Mediterranean from both the adjacent regions, i.e. the Eastern and the Western Mediterranean basins, to be defined and deep veins of dense water crossing this region to be detected. The gathered data set shows that deep veins of dense water coming from both the region boundaries, namely the Sicily Strait and the Sardinia Channel, are permanent components of the water inflow. In this paper we investigate their evolution throughout the Central Mediterranean using a novel formulation of potential vorticity in shallow water approximation. A well-known difficulty in the potential vorticity theory is related to a correct quantification of the friction and mixing effects, which are extremely important in the vein’s development. A realistic estimate of these parameters in the investigated region allows us to define the width, velocity and local effects of these deep flows, and thus to clarify the dense water dynamics inside local sea bottom depressions and large-scale dense water pools. In this way a phenomenon of considerable interest, namely the dynamics of density currents crossing and flowing out of a sea strait, is examined and discussed in detail.