Abstract View

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Dynamics of Eddy Motions in the Eastern North Atlantic

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ABSTRACT

The behavior of the intense anticyclonic eddy observed during the Tourbillon Experiment (September-November 1979) is studied within the framework of quasi-geostrophic dynamics. The nondivergent part of the pressure held is estimated through objective analysis at the times of four quasi-synoptic CTD arrays, making use as well of velocity data from the current-meter mooring array and subsurface acoustic floats. Maps of relative vorticity, vortex stretching and potential vorticity allow identification of the signature of the eddy. Nearby companion anomalies caused by an intrusion of Mediterranean Water (MW) can be singled out and are comparable to those of the main eddy around 1200 m. Eulerian and Lagrangian tests of the conservation of potential vorticity are presented and the close similarities of salinity and potential vorticity as tracers of mesoscale motions are vividly demonstrated. Computations of advection of vortex stretching and relative vorticity show that the anticyclonic path of the main eddy above 1000 m is controlled by a genuine interaction with the MW intrusion whose ultimate cited is to sheer the vertical axis of the eddy. It is argued that such interactions must be rather common in the eastern North Atlantic for warm salty patches of Mediterranean origin are often associated with low density anomalies.