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The Structure, Dynamics, and Origin of a Small-Scale Lens of Water in the Western North Atlantic Thermocline

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ABSTRACT

A small-scale, isolated, anticyclonically rotating lens of water was observed in the western North Atlantic thermocline during the POLYMODE Local Dynamics Experiment. Using a combination of SOFAR float, hydrographic, nutrient, and moored current and temperature data, we deduce that the lens was about 20 km across with a thickness not greater than 300 m, centered on 750 m; that its shape was not dissimilar to that of a vertical-radial Gaussian eddy; and that at its center, the lens had strong anomalies of salinity, dissolved oxygen, nitrate, and vortex stretching. The water mass properties within the eddy are not inconsistent with an origin for the feature near 15°N, 54°W, several thousand kilometers from where it was observed in the western North Atlantic, although an unambiguous origin cannot be discerned from the data. If such features are not uncommon, they may be an important mechanism for large-scale mixing of water properties in the ocean.

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