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Large Eddy Simulation of Turbulent Coherent Structures in a Storm-forced Surface Ocean Mixed Layer CLIFFORD WATKINS, Department of Marine and Coastal Sciences, Rutgers University, DANIEL WHITT, National Center for Atmospheric Research — Submesoscale roll vortices in the oceanic mixed layer (OML) are important to understanding and constraining the flux of momentum from the atmosphere into the ocean. In this study, we use large eddy simulations (LES) to investigate the impact of the superposition of Ekman inflection-point (EIP) instabilities on the entrainment and deepening of a shallow coastal ocean pycnocline under the wind forcing of Hurricane Irene (2011). We used reanalysis of the hurricane winds to force LES domains 100m to 4km in the horizontal dimension to observe the development and influence of EIP rolls. The EIP instability has a domain-scale independent wavelength on the order of 500m to a kilometer and transfers momentum to the shear instabilities at the pycnocline, leading to a more rapid deepening and cooling of the OML during the hurricane. By understanding the physical processes driving the changes in the OML both ahead-of-eye and at eye-passage will aid in predictions of tropical cyclone intensity over stratified coastal oceans.

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