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Restratification at oceanic fronts by baroclinic instabilities VICKY VERMA, HIEU PHAM, VAMSI CHALAMALLA, SUTANU SARKAR, University of California, San Diego — Large eddy simulation with adaptive mesh refinement is used to investigate how stratification in the upper ocean surface layer evolves at frontal zones. The model includes a front with both lateral and vertical density gradients that is initially in geostrophic balance. The vertical density gradient consists of a mixed layer and a thermocline with constant stratification. Cases with different mixed layer depth are explored to contrast how the front equilibrates in different seasons. The evolution of the flow consists of the growth of baroclinic instability followed by nonlinear evolution into three-dimensional eddies that stir fluid across the front. These eddies create thin regions that have elevated shear, density gradient and turbulent mixing. The difference in the flow dynamics between the mixed layer and the thermocline is described using the organization of vortical structures and quantified through momentum and energy budgets.

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