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Turbulent mixing in a barrier layer HIEU PHAM, SUTANU SARKAR, University of California, San Diego — Large-eddy simulation (LES) is used to investigate the erosion of a barrier layer in the upper ocean by wind-driven turbulence. The initial vertical density profile consists of three regions: a buoyantly neutral surface layer, an isothermal salt-stratified region (the so-called barrier layer) and a thermally stratified deep region. A constant wind-stress and a diurnal heat flux are applied at the surface to drive the turbulence. During the night, the wind stress generates shear in the mixed layer. The shear deepens and causes Holmboe shear instability at the interface between the mixed layer and the barrier layer where the gradient Richardson number falls below 0.25. In time, the barrier layer becomes thinner, and the mixed layer thickens with increasing surface salinity. In the morning, as the surface heat flux warms the mixed layer, a temperature inversion is formed on top of the barrier layer. The surface heating suppresses the turbulence in the surface layer; however, the mean shear continues to increase and causes occasional bursts of shear instability. The instability mixes up the temperature inversion by the afternoon.

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