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Evolution of deep-cycle turbulence in an Equatorial Undercurrent Model HIEU PHAM, SUTANU SARKAR, KRAIG WINTERS, UC San Diego — Large-Eddy Simulation is used to investigate the relationship between the near-N oscillations and the deep-cycle turbulence in the Equatorial Undercurrent. The profiles of velocity and density in the model are similar to those observed in the field. A constant wind stress and a diurnal heat flux are applied at the surface. The model is simulated for a 2-day duration. During the day time, the wind accelerates the surface water increasing the surface shear but the turbulence intensity is low due to heating. In the evening, when the heat flux becomes neutral, shear instabilities develop in the surface layer and generate turbulence. At night time, convection due to surface cooling creates a well-mixed layer. Later at night when the convection subsides, shear instabilities grow at the base of the mixed-layer where the local gradient Richardson number falls below the critical value of 0.25. The evolution of the shear instabilities includes the temporal fluctuations of the isopycnals as well as turbulent mixing due to coherent eddies. The turbulence extends well below the surface mixed layer and lasts for a few hours. Result from our model suggests that the oscillations and the deep-cycle turbulence are related to a shear instability local to the base of the mixed layer.

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