Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Evolution of turbulence at a frontal zone HIEU PHAM, VICKY VERMA, SUTANU SARKAR, University of California, San Diego — Large-eddy simulations are used to investigate processes leading to turbulence at an ocean front. The geostrophically-balanced front follows Eady's model with a uniform lateral density gradient. In the vertical direction, the front consists of two layers, each with a linear stratification. The upper 50-m surface mixed layer is weakly stratified with the gradient Richardson number, Ri, equal to 0.25. The lower 50-m pycnocline has a stronger stratification with Ri = 3. The evolution of turbulence includes both symmetric instability and baroclinic instability. Consistent with linear theory, symmetric instability only develops in the surfaced mixed layer. Secondary shear instabilities subsequently grow along the slanted isopycnals and induce turbulence in the front. At a later time, baroclinic instability develops into full-depth submesoscale eddies which are intertwined with thin filaments of enhanced lateral shear. Strong turbulence is localized around the periphery of the eddies and along the filaments. Spectral analysis indicates the energy transfer at the geostrophic scales differs significantly from that at the smaller turbulent scales.

Hieu Pham
University of California, San Diego

Date submitted: 01 Aug 2017 Electronic form version 1.4