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Subduction at upper ocean fronts by baroclinic instability VICKY VERMA, HIEU T. PHAM, Univ of California - San Diego, ANAND RADHAKRISHNAN, Indian Institute of Technology Bombay, SUTANU SARKAR, Univ of California - San Diego — Large eddy simulations of upper ocean fronts that are initially in geostrophic balance show that the linear and subsequent nonlinear evolution of baroclinic intability are effective in restratifying the front. During the growth of baroclinic instability, the front develops thin regions with enhanced vertical vorticity, i.e., vorticity filaments. Moreover, the vorticity filaments organize into submesoscale eddies. The subsequent frontal dynamics is dominated by the vorticity filaments and the submesoscale eddies. Diagnosis of the horizontal force balance reveals that the regions occupied by these coherent structures have significantly large imbalance, and are characterized by large vertical velocity. High density fluid from the heavier side of the front is subducted by the vertical velocity to the bottom of the mixed layer. The process of subduction is illustrated by Lagrangian tracking of fluid particles released at a fixed depth.

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