

Department of Ocean & Resources Engineering

Seminar

Mixing and Turbulence in Hydraulically Controlled Flow

by

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Abstract

Downslope currents and the associated mixing processes are important in estuarine and coastal environments as well as in atmospheric flow (downslope winds) and sediment transport (turbidity currents). The developing region of a steady downslope current in transition from a hydraulically controlled arrested wedge flow is examined through a set of laboratory experiments. The mixing and entrainment mechanisms at the shear interface are explored with the use of imaging techniques. The initial, unstable accelerating region, characterized by rapid development, low shear layer Richardson numbers and high entrainment rates, is limited by the effects of stratification which suppress the large scale overturning. A subsequent high Richardson number region is characterized by weak entrainment and the collapse of turbulence from the initial region. Further downstream, a quasi-stable state is maintained as the mixed layer draws energy from the accelerating density current. Entrainment rates are calculated within each region for the various slopes considered and estimates for the extent of the transition regions are obtained.