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Wind-Induced Destratification in Chesapeake Bay

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ABSTRACT

Multiyear continuous observations of velocity and salinity in the Chesapeake Bay indicate that wind-induced destratification occurs frequently from early fall through midspring over large areas of the estuary. Storm-driven breakdown of summer stratification was observed to occur near the autumnal equinox in two separate years. Surface cooling plays an important, though secondary, role in the fall destratification by reducing the vertical temperature gradient in the days prior to the mixing event. Large internal velocity shear precedes mixing events, suggesting a mechanism involving the generation of dynamic instability across the pycnocline. Destratification is shown to fundamentally alter the response of the velocity field to subsequent wind forcing; in stratified conditions, response is depth-dependent, while after mixing a depth-independent response is observed.

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