Abstract View

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Wind-Driven Circulation in the Chesapeake Bay, Winter, 1975

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ABSTRACT

Nontidal circulation in Chesapeake Bay was examined from one-month current records at 50 and 200 km from the entrance. The monthly mean flow was basically a two-layered circulation; in addition, there were large wind-driven velocity fluctuations at several-day time scales. Corresponding to velocity changes, the salinity distribution had large variations, comparable to its seasonal change.

Bay water responded to longitudinal (local) wind and coastal (nonlocal) Ekman flux. The response was barotropic in the lower Bay, and baroclinic (frictional) in the upper Bay. The difference in response characteristic appears to be due to the counter-effects of the near-surface windstress shear and the depth-independent surface slope. A frictional model accounts for most of the observed features.

Results of this study provide further evidence of large, atmospherically induced exchange between the estuary and coastal ocean. The importance of wind on upstream salt intrusions is also clearly demonstrated.