Program and Agenda

Abstract

THE ROLE OF WIND IN ESTUARINE CIRCULATION

In the search for details of the driving mechanism for estuarine circulation, evidence has been accumulating that wind mixing plays an important role and may even dominate tidal mixing in estuaries with large fetch and modest tides. To meet the challenge of separating wind mixing from tidal mixing and then assessing their contributions to driving the gravitational circulation, a program of intensive observations and modeling is underway in Chesapeake Bay. Initial results support the hypothesis that wind mixing can dominate, starting with the simple finding that without wind, the Bay tends to revert from a partially mixed to a salt-wedge estuary. The dense instrument array (including a set of ADVs and temperature-salinity sensors on a guyed tower) combined with towed undulating vehicle surveys reveal detailed views of known wind responses such as lateral upwelling, time-variable wind straining, and the phased, two-layer longitudinal response, but also spatially varying structures in lateral circulation and surface slopes.

Evidence that wind produces the dominant mode of mixing leads to the question of how the estuary integrates the pulsed-response process into the steadier gravitational flow.

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Details

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