Abstract View

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Spring Thermocline Behavior in Lake Ontario During IFYGL

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ABSTRACT

A dynamical analysis is presented of some observations made during the International Field Year on the Great Lakes (IFYGL) on the north shore of Lake Ontario at Oshawa. The data analyzed relate to water movements during the spring thermal regime, when a warm water band at the shores surrounds a cold central lake mass. Two periods are discussed in detail which demonstrate the influence of wind-stress impulses in generating respectively westward flow associated with a wedge-shaped spring thermocline, and eastward flow with a lens-shaped thermocline.

The day-to-day changes in depth-integrated momentum transport in the shore zone show most clearly the direct effects of storms. Important modifying influences are bottom friction and momentum advection by onshore-offshore water movements. The way in which the momentum is partitioned between the surface (warm) water and the underlying water mass illustrates an important effect of the Coriolis force, which effectively transfers momentum downward. Earth rotation effects are also responsible for inertial oscillations of the interface between cold and warm waters. On some occasions this interface is maintained in an inclined position by geostrophic balance between the pressure gradient and the Coriolis force. Thus, the important physical factors in spring thermocline mechanics are seen to be wind stress, stratification and Coriolis force, complicated by some more or less obvious effects of bottom friction and momentum advection.