Abstract View

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Response of Large Stratified Lakes to Wind

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ABSTRACT

The response of a simple Great Lake model to wind stress is studied theoretically. The model is of constant depth and of circular shape, *continuously* stratified with a thermocline region of linear density distribution. The excitation of natural modes of oscillation is calculated for a suddenly imposed uniform wind stress and for one acting for a finite period. The results show that strong Kelvin-type (shore-bound) waves are generated in the first few baroclinic modes, which give rise to “coastal jets” of a width of order 5 km and less, the combination of several baroclinic modes resulting in a complex structure for these jets. In the central portions of the lake model the response consists of Poincaré-type waves of near-inertial frequency. The qualitative features of the theoretical results agree quite well with observational evidence from the Great Lakes.