Abstract View

Volume 7, Issue 5 (September 1977)

Journal of Physical Oceanography
Article: pp. 719–732 | Abstract | PDF (1.43M)

Response of the Coastal Boundary Layer on the North Shore of Lake Ontario to a Fall Storm

F.M. Boyce

Physical Limnology Section, Hydraulics Research Division, Canada Centre for Inland Waters, Burlington, Ontario, Canada L7R 4A6

(Manuscript received January 17, 1977, in final form April 28, 1977)

DOI: 10.1175/1520-0485(1977)007<0719:ROTCBL>2.0.CO;2

ABSTRACT

Water temperature measurements have been made from a ship steaming continuously around a 10 km square on the north shore of Lake Ontario during a vigorous upwelling and downwelling cycle generated by a fall storm. These measurements reveal the existence of horizontal eddies and meanders within the coastal boundary layer having scales between 1 and 10 km. Active internal waves and a rich vertical microstructure are also observed. The above features are considered to be indicative of horizontal and vertical mixing processes generated by large-scale (10 km) adjustments of the coastal boundary layer. The wealth and diversity of the small-scale features suggest that the usual methods of parameterizing geophysical turbulence in terms of large-scale motion will be of little use in the coastal zone and, consequently, the outlook for deterministic modeling of the coastal flow regimes is not bright. It is concluded that very simple dynamical models of the large-scale motions allow one to divide the shorelines of a large lake into a relatively small number of dynamically homogeneous zones. Details of the behavior within each zone must be supplied by field observations of winds, currents and temperatures in the form of a regional coastal climatology.