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The Coastal Boundary Layer in Lake Ontario. Part I: The Spring Regime

G.T. Csanady

Environmental Fluid Mechanics Lab., University of Waterloo, Waterloo, Ontario

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ABSTRACT

Originally prompted by a desire to search for theoretically predicted “coastal jets,” an extensive series of observations on currents in the coastal zone near Oshawa, in Lake Ontario, were carried out during 1969 and 1970. The observation technique consisted of anchoring marker flag stations at increasing distances from the shore, forming a “coastal chain” more or less perpendicular to the shore, then collecting current and temperature observations from a small boat by hand-held instruments at a number of depths at each station. During the 1970 season a set of four fixed current meters was also used, providing a temporal history of the currents.

This paper presents the results of observations collected during the “spring” period (May to early June) which showed a current regime different in character from that observed during summer or fall. A near-shore band (~ 7 km wide) becomes a unique kind of boundary layer in which mid-lake motions adjust to the presence of the shores. During the spring significant motion is indeed often confined to the vicinity of the coastal boundary layer. Many complex physical factors appear to be involved in determining the current structure in this boundary layer, among them the Coriolis force, inertial accelerations, friction and stratification. The main driving force of these motions is the wind stress at the free surface. A general characteristic of the observed motions is great spatial variability.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693

DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826

amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718

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