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Near-Surface Measurements of Quasi-Lagrangian Velocities in Open Water

J.H. Churchill and G.T. Csanady

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

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ABSTRACT

Near-surface water velocities have been measured in the coastal zone of Lake Huron and Cape Cod Bay by tracking drifters and drogues using acoustic travel time and compass sighting techniques. The near-surface current, defined as the velocity of near-surface drifters and drogues relative to a drogue set at 1.8 m, varied on the depth scale on the order of 1 m, and was directed nearly parallel to the wind and to predominant wave propagation velocity. Velocity profiles were logarithmic with depth to order 1 m depth, and realistic values of stress were calculated using a law of the wall formula and a Kármán's constant of 0.4. Inferred roughness lengths were of the order of 30 cm. Anomalously high values of wind stress were inferred from velocity profiles observed during conditions of light wind and steady swell. These may be due to the similarity of Stokes drift distribution to turbulent shear flow profiles.

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