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[Volume 5, Issue 1 \(January 1975\)](#)

Journal of Physical Oceanography

Article: pp. 111–124 | [Abstract](#) | [PDF \(904K\)](#)

Nearshore Lake Currents Measured During Upwelling and Downwelling of the Thermocline in Lake Ontario

J.O. Blanton

Canada Centre for Inland Waters, Burlington, Ontario, Canada

(Manuscript received January 31, 1974, in final form July 11, 1974)

DOI: 10.1175/1520-0485(1975)005<0111:NLCMDU>2.0.CO;2

ABSTRACT

The upwelling-downwelling cycles observed along the north shore of Lake Ontario have periods of about 12 to 16 days in length. Currents associated with the downwelling cycle are typically stronger. The periods of the cycles are at least a factor of 2 larger than are periods expected from cyclone movements across the Great Lakes. Although the upwelling/downwelling cycles are generally a response to the wind, this discrepancy suggests a tendency for a more wave-like periodic response.

The kinetic energy in currents near the theoretical inertial period clearly delineates a nearshore zone of about 8 km in width. Internal wave periods observed are 14 and 17 h, but no 14 h periods are observed beyond 8 km. Most of the upwelling and downwelling is confined to this zone. The sloping shore model of Csanady appears to accurately predict the extent of this zone.

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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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