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Verification of Numerical Models of Lake Ontario III. Long-Term Heat Transports

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ABSTRACT

Numerical computations of water circulations, combined with observed temperature distribution, permit estimates of heat transports in Lake Ontario throughout the 1972 International Field Year. Weekly estimates of heat budgets and surface fluxes are available from ship surveys and meteorological observations, thus allowing for validation of model results. Whereas the hydrodynamic model employs a grid mesh of 5 km, the present verification study is based on 21 lake zones, with the mean depth contour separating shore zones from mid-lake areas.

Agreement between simulations and observations ranges from satisfactory to poor, as a function of both time and space. The model is found to perform best along the north shore and in the fall season. Analysis of the results points at low model resolution and gaps in the observational network as the major causes of failure to reproduce south shore heat transports. Persistent overestimates of heat advection by vertical circulations are ascribed to the present structure of the hydrodynamic model.

A brief discussion is included of the present heat transport calculations in the context of estimating vertical mixing properties for different lake zones.

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