

## Modeled ice thickness in Lake Erie with different parameterizations of the ice strength

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An unstructured grid Finite-Volume Community Ocean Model (FVCOM) is applied to Lake Erie to simulate seasonal ice cover. The model is coupled with an unstructured-grid, finite-volume version of the Los Alamos Sea Ice Model. Given that there has been no solid formulation for the ice strength  $P$  for relatively thin ice in Lake Erie, a sensitivity study was conducted using the existing formulations of  $P$ . The probability density distribution of modeled ice thickness presented significant variability with the  $P$  parameterizations. The energy-based parameterization from Rothrock (1975) and Lipscomb et al. (2007) produced too thick ice, but this is not surprising as this parameterization was originally developed for thick ice in the Arctic Ocean where pressure ridges are more common, while thin ice and rafting would be more common in Lake Erie. Overall, the simple Hibler (1979)'s parameterization presented better agreement with the observed ice conditions. A better set of ice thickness observations is needed for a more rigorous formulation of  $P$  in Lake Erie and the four other Great Lakes.

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