



Idealized Numerical Simulations of Ontario's Grand River Plume

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Ontario's Grand River is a small river entering the eastern basin of Lake Erie. Typical volume fluxes at the river mouth are usually less than 50 cubic meters per second (cms) during the summer but can exceed 1000 cms at times during spring run-off or winter melts. It is the largest river along Lake Erie's north shore excluding the Detroit River which connects Lake Huron and Lake Erie. Lake Erie is the shallowest and warmest of the Laurentian Great Lakes yet receives the most nutrients and produces the most fish. Because of its physical properties and the large nutrient load it is prone to harmful algal blooms and the formation of hypoxic water. In this talk we will present results of ongoing idealized high resolution numerical simulations of river plumes in a rectangular domain based on the parameters of the Grand River plume and the eastern basin of Lake Erie. The MITgcm, a three-dimensional primitive equation numerical model with non-hydrostatic capability, has been used. We focus on the sensitivity of the results to viscosity and resolution using horizontal resolutions down to 10 m. Both buoyant and plunging plumes during weakly and strongly stratified periods are considered.