

Abstract Submitted
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Large-eddy simulation of oxygen transport and depletion in waterbodies CARLO SCALO, UGO PIOMELLI, LEON BOEGMAN, Queens University — Dissolved oxygen (DO) in water plays an important role in lake and marine ecosystems. Agricultural runoff may spur excessive plant growth on the water surface; when the plants die they sink to the bottom of the water bodies and decompose, consuming oxygen. Significant environmental (and economic) damage may result from the loss of aquatic life caused by the oxygen depletion. The study of DO transport and depletion dynamics in water bodies has, therefore, become increasingly important. We study this phenomenon by large-eddy simulations performed at laboratory scale. The equations governing the transport of momentum and of a scalar (the DO) in the fluid are coupled to a biochemical model for DO depletion in the permeable sediment bed [Higashino et al., *Water Res.* (38) 1, 2004)], and to an equation for the fluid transpiration in the porous medium. The simulations are in good agreement with previous calculations and experiments. We show that the results are sensitive to the biochemical and fluid dynamical properties of the sediment, which are very difficult to determine experimentally.

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