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Fate and Transport of Fluid Mixed at the Boundary of a Lake

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Iowa State University — Several studies have shown that fluxes in stratified water bodies are controlled by turbulence and mixing at sloping boundaries, but fewer have investigated the fate of the mixed fluid. We conducted field experiments in two Iowa lakes to track fluid mixed on the sloping sides as it moved into the interior of the lake. Measurements from a meteorological station characterize the forcing, while measurements from thermistor chains and acoustic profilers provide information on the resulting internal waves. Tracer measurements combined with microstructure profiling illustrate the boundary mixing and transport of mixed fluid. In one case in the smaller of the two lakes, turbulence created by currents from long internal waves mixed fluid that propagated from the shore as an intrusion governed by a balance between inertia and buoyancy. In another case, the transport is more likely due to a jet corresponding to the second vertical mode of the internal waves. Recent results from a larger lake will be used to determine the effect of lake size and geometry on the transport.

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