Mixing in Steady-State Gravity Currents

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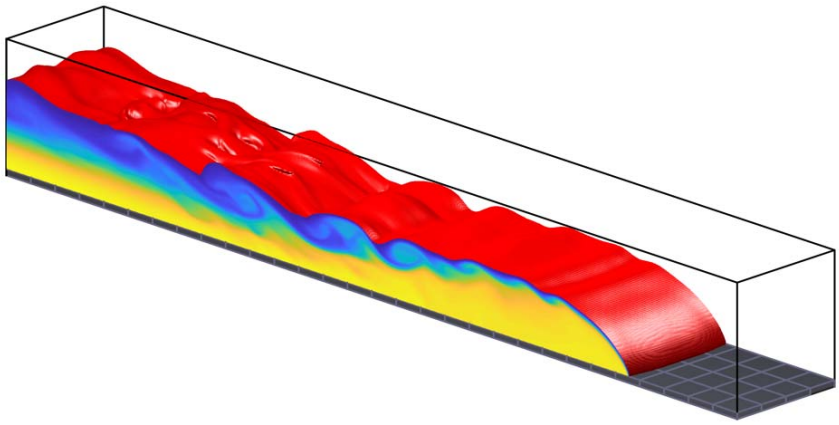
Turbidity currents have been observed to propagate for very long distances, longer than one would expect based on the current knowledge of mixing and evolution of gravity currents. Recent DNS simulations, as the one shown in the figure below, suggest that when in steady state the gravity current presents a much more stable interface, potentially reducing the mixing with ambient waters and hence being able to survive and propagate for longer distances.



This project will investigate experimentally 'steady state' gravity currents as opposed to lock-release gravity currents, with particular emphasis on the interfacial instability and assess whether the 'flavor'/characteristics of this shear instability and the induced turbulence are different in a steady state scenario as opposed to a more 'transient' scenario which has been investigated using lock-release gravity currents. The project will perform gravity current experiments in a flume that reach a statistically steady state and compare the results from that experiment to those obtained with a classic lock release set up. Further comparison will be made with the DNS and theoretical results.

Relevant References:

Scotti, A. "A numerical study of the frontal region of gravity currents propagating on a free-slip boundary." *Theoretical and Computational Fluid Dynamics* 22.5 (2008): 383.