The entrainment rate of a rotating gravity current.

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A gravity current flowing down a slope entrains surrounding fluid, with the result that the density contrast of the gravity current decreases and the volume increases. This rate of increase in volume is known as the entrainment rate. In a few regions of the oceans there are sites where dense waters flow down continental slopes under the influence of buoyancy and Coriolis forces. As these dense waters sink they entrain surrounding fluid which modify the original water mass properties. If dense enough, these water masses will spread at depth over the base of the worlds oceans, providing the source of deep waters for the thermohaline circulation, often called the global "conveyer belt".

We will present new laboratory experiments of measurements of the entrainment rate of a gravity current as a function of slope and rotation rate. In a finite volume container the outflow from the gravity current will start to build a background stratification and circulation, analogous to the oceanic thermohaline circulation. We will show how the entrainment rates of a rotating gravity current on a slope can be related to the classic Baines & Turner (1968) filling box model, in order to predict the long term stratification and circulation timescales.