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Influence of Internal Waves on Transport by a Gravity Current[1]
JEFFREY KOSEFF, CHARLIE HOGG, Stanford University, RAPHAEL OUILLON, University of California, Santa Barbara, NICHOLAS OUELLETTE, Stanford University, ECKART MEIBURG, University of California, Santa Barbara — Gravity currents moving along the continental slope can be influenced by internal waves shoaling on the slope resulting in mixing between the gravity current and the ambient fluid. Whilst some observations of the potential influence of internal waves on gravity currents have been made, the process has not been studied systematically. We present laboratory experiments, and some initial numerical simulations, in which a gravity current descends down a sloped boundary through a pycnocline at the same time as an internal wave at the pycnocline shoals on the slope. Measurements of the downslope mass flux of the gravity current fluid in cases with different amplitudes of the incident internal wave will be discussed. For the parameter regime considered, the mass flux in the head of the gravity current was found to reduce with increasingly larger incident amplitude waves. This reduction was effectively caused by a "decapitation" process whereby the breaking internal wave captures and moves fluid from the head of the gravity current back up the slope. The significance of the impact of the internal waves on gravity current transport, strongly suggests that the local internal wave climate may need to be considered when calculating gravity current transport.

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