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Dynamics of continuously released gravity currents from a moving source RAPHAEL OUILLON, THOMAS PEACOCK, MIT, ECKART MEIBURG, University of California, Santa Barbara — Emerging technologies such as deep-sea mining and geoengineering pose fundamentally new questions regarding the spatio-temporal dynamics of particle-driven gravity currents. Such activities can continuously release dense sediment plumes which propagate as gravity currents along the sea bed. The study of gravity currents has historically focused on the dam-break configuration and a fundamental analysis of the flow resulting from the release of dense fluid from a moving source has never been carried out. Here, we present the results of idealized numerical simulations of this novel configuration, and investigate the propagation of the resulting gravity current as a function of the ratio of the source speed to the buoyancy velocity that results from the introduced density gradient. We show that above a certain value of this ratio, the flow enters a hyperbolic regime in which the source moves more rapidly than the generated current, resulting in a statistically steady state in the reference frame of the moving source. In this regime, fluid in the head of the current moves predominantly in the direction normal to the direction of motion of the source and the time evolution of the front is well described by the classical lock-release mechanism.

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