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Lock-release gravity currents over a sparse and dense rough bottom[1] CLAUDIA CENEDESE, Woods Hole Oceanographic Institution, ROGER NOKES, University of Canterbury, JASON HYATT, Massachusetts Maritima Academy — Dense oceanic overflows mix with surrounding waters along the descent down the continental slope. The amount of entrainment and dilution dictates the final properties of these overflows, and thus is of fundamental importance to the understanding of the formation of deep water masses. We will discuss laboratory experiments investigating the mechanisms by which bottom roughness enhances or inhibits entrainment and dilution in a lock-release dense gravity current. The bottom roughness has been idealized by an array of cylinders. Both spacing (sparse vs. dense configuration) and height of the roughness elements compared with the height of the current have been varied. Both density and velocity fields have been obtained. Experimental results suggest that enhancement of the entrainment/dilution of the current can occur due to two different mechanisms. For a sparse configuration the dense current propagates between the cylinders and the entrainment is enhanced by the vortices generated in the wake of the cylindrical obstacles. For a dense configuration the dense current rides on top of the cylinders and the dilution is enhanced by the onset of convective instability between the dense current above the cylinders and the ambient lighter water between the cylinders. For large values of the ratio of the lock height to the cylinder height, H/h_c, the dense current behavior approaches that of a current over a smooth bottom, while the largest deviations from the smooth bottom case are observed for small values of H/h_c.

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