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Experimental and Numerical Simulation of Dense Water Overflows on a Continental Slope

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A gravity current flowing down a uniform slope in a stratified or homogeneous media in rotation is analyzed. This configuration represents the descent of dense water over a sill (like in the Denmark strait) which controls the global density structure of the ocean interior. This study aims to determine experimentally the principal characteristics of such a current like its position, width, thickness, velocity, or development of periodic instabilities and to measure effects of bottom friction, mixing and entrainment in a rotating system. Gravity currents obtained in experiments performed on the large Coriolis turntable (Grenoble) are strongly influenced by rotation and still fully turbulent, in dynamical similarity with oceanic cases. Laboratory facilities provide high resolution velocity fields from image correlation measurements, and accurate density profiles from conductivity probes. Those experimental results are compared with oceanic numerical models to test the influence of parameterizations.

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