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Turbidity Current Head Mixing

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A laboratory experimental set - up for studying the behaviour of sediment in presence of a turbulent field with zero mean flow is compared with the behaviour of turbidity currents [1] . Particular interest is shown on the initiation of sediment motion and in the sediment lift - off. The behaviour of the turbidity current in a flat ground is compared with the zero mean flow oscilating grid generated
turbulence as when wave flow lifts off suspended sediments [2,3].

Some examples of the results obtained with this set-up relating the height of the head of the turbidity current to the equilibrium level of stirred lutoclines are shown. A turbulent velocity u' lower than that estimated by the Shield diagram is required to start sediment motion. The minimum u' required to start sediment lift - off, is a function of sediment size, cohesivity and resting time. The lutocline height depends on u', and the vorticity at the lutocline seems constant for a fixed sediment size [1,3].

Combining grid stirring and turbidty current head shapes analyzed by means of advanced image analysis, sediment vertical fluxes and settling speeds can be measured [4,5].

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