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An analysis of entrainment and deposition rate fluctuations in weak bed load transport

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ABSTRACT

The kinematics of particles moving over a fixed rough bed was experi-mentally investigated. Motion of sediment particles was recorded from the top of a pressurized duct using a CCD camera, then image processing was applied in order to track each particle. Particle tracking provides quantitative information about the time evolution of particle position and velocity. However, in this paper attention is focused onto the entrainment and deposition of particles. The entrainment rate may be used to quantify the solid discharge (through, for example, some pick-up function); the deposition rate is the counterpart of the former, that has however received comparatively less attention in previous studies of sediment transport. Temporal signals of the entrainment and deposition rates were investigated for different spatial and temporal scales, demonstrating how the intermittency of the transport process affects the fluctuation patterns. Consequently, the (spatial or temporal) scale dependency of the statistical moments of these rates was explored. An expected result was found, with scale-independent average values of the en-trainment and deposition rates and a strong dependence on the support scale for the standard deviation values.