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Sediment transport and morphodynamics induced by a translating vortex¹ MATIAS DURAN-MATUTE, SAMUEL GONZALEZ-VERA, GERT-JAN VAN HEIJST, Eindhoven University of Technology — We present experimental results on the effect of a translating monopolar vortex on a sediment bed. Experiments took place inside a water-filled square tank with a flat layer of small spherical particles at the bottom and placed on top of a rotating table. A vortex is generated on the tip of a plate perpendicular to one of the sidewalls by drastically changing the speed of the rotating table from a state of solid body rotation. This change was designed such that a residual current remained, advecting the vortex away from the plate. Strong-enough vortices bring sediment into suspension and transport it along their path. As the vortices weaken, the sediment settles back into the bed. This mechanism produces changes in the bed. Measurements of the flow were obtained through particle image velocimetry (PIV). The region of suspended sediment was reconstructed using images of the particles illuminated by a vertically oscillating horizontal laser sheet, and the changes in the bed thickness were measured with a photogrammetric technique. The strength of a vortex is the main parameter governing the capture and suspension of particles with similar settling velocity. A power law was found between the vortex strength and the net displaced particle volume.

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