



Influence of bedload diffusion on the shape of a river

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In the absence of sediment transport, the equilibrium width of a river results from the balance of gravity and fluid friction at the scale of a sediment particle. However, this theory breaks down when the river transports sediment. We present a laboratory investigation of bedload transport in laminar flows. The analysis of individual grain trajectories reveals that, although particles move mostly downstream, their sidewise velocity also fluctuates. This erratic motion, similar to a random walk, causes bedload to disperse laterally. The resulting diffusion of sediment explains why the river widens when the sediment discharge increases.