



## **Dispersion of a plume of tracer particles by bedload transport**

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Particles entrained by rivers tend to disperse as they move downstream. Understanding the mechanisms responsible for particle dispersion is therefore important to describe the transport of solid-phase contaminants in streams or the accumulation of cosmogenic radionuclides in sediment grains during transport. While the prediction of the sediment transport rate at a specific point has been the topic of a large number of investigations, particle dispersion has however received much less attention. Here, we use the erosion-deposition model proposed by Lajeunesse et al. [2010] to understand the transport of a plume of tracer particles. We restrict our analysis to the case of steady-state transport above a flat bed of uniform sediment. We show that, at equilibrium, the transport of a plume of tracer particles obeys an advection-exchange mechanism. After a transient dominated by initial conditions, the transport of the plume tends toward an advection-diffusion equation.