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Thresholds, memory, and self-similarity on river deltas MEREDITH REITZ, Dept Physics and Astronomy, University of Pennsylvania, DOUGLAS JEROLMACK, Dept Earth and Environmental Science, University of Pennsylvania — The bulk dynamics of river deltas and alluvial fans result from several physical processes acting on a wide range of scales. We study a series of experimental alluvial fans to sort the relevant processes and determine the way in which their interaction drives fan behavior. We find a timescale of channel movement that depends on mass conservation, as sediment fills a wedge of space determined by a separation between conditions of grain entrainment and distrainment, in a manner analogous to the separation between static and dynamic angles of repose in dry granular systems. Channel path selection behavior shows a marked tendency for flow to reoccupy abandoned paths, in a way that can be abstracted with a random walk model in a system with absorbing states, and resulting in a predictable self-similar shoreline growth pattern. Because we isolate the processes that drive the evolution of our experimental fans, we are able to translate our findings to the study of natural fans and deltas in which the same processes operate.

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