



Controls on alluvial fan morphology

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Using laboratory experiments, we investigate the influence of water and sediment discharges on the morphology of an alluvial fan. In our flume, a single-thread river deposits corundum sand (0.3 mm) into a conical fan. We record the fan progradation with top-view images, and measure its shape using the deformation of a Moiré pattern. The fan remains virtually self-affine as it grows, with a nearly constant slope.

We find that, when the sediment discharge is small, the longitudinal slope of the fan remains close to that of a river at the threshold for sediment transport. A higher sediment discharge causes the fan's slope to depart from the threshold value. Due to the downstream decrease of the sediment load, this slope gets shallower towards the fan's toe. This suggests that the proximal slope of an alluvial fan could be a proxy for the sediment flux that feeds it.