



Influence of piedmont sedimentation on erosion dynamics of an uplifting landscape: an experimental approach

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Models of relief development generally assume that eroded products are evacuated far from the landscape whereas in nature they often deposit at the foot of mountain belts, within continental environments. Because piedmont aggradation can modify the base-level for erosion we ask what is the influence of piedmont sedimentation on the dynamics of an upstream relief. We developed an experimental study of relief dynamics using laboratory-scale models submitted to uplift under runoff-driven erosion. We compare the dynamics of topographies surrounded or not by a depositional belt made of eroded products coming from upstream. Piedmont aggradation acts on the dynamics of the upstream relief by modifying the relative uplift rate (applied uplift rate minus aggradation rate) that denudation tends to balance. Relief denudates at a lower rate than the applied uplift rate so the mean elevation of the uplifting topography rises. When the timescale of aggradation is higher than the timescale of relief development the topography cannot reach a steady-state between denudation and the applied uplift rate as long as aggradation occurs. However, in this case denudation balances a continuously varying relative uplift rate during a dynamic equilibrium phase of the topography.