# Longitudinal river profiles as tectonic archives

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One of the simplest models of fluvial erosion is based on empirical data published 50 years ago by J.T. Hack. Erosion rate is a power-law function of drainage area and slope gradient. In this study, a linear perturbation theory for equilibrium river profiles based on this model is derived. As a surprising result, disturbances propagate in upstream direction at a constant vertical velocity. This result is independent of the river size, so that disturbances should be visible in both small and large rivers in a catchment at the same absolute altitude. The vertical propagation velocity is about two to three times the mean erosion rate. Thus, long rivers may carry information on a time span of up to about one million years. However, first test applications refer to small rivers where effects of structural heterogeneity can be better distinguished from propagating disturbances.