



Response times of bedrock channel morphology to external forcing

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Bedrock channels adjust their morphology, often quantified by channel bed slope and channel width, to boundary conditions set by the tectonic regime and climate. Knowledge of the steady state morphology is necessary for example to calculate bedload transport capacity in landscape evolution models, or to invert stream profiles to extract tectonic information. A change in boundary conditions such as climate change necessitates the adjustment of the channel morphology. During the transient phase of adjustment typical scaling relations may not hold, which has implications for the interpretation of channel morphology and landscape dynamics. Here, based on a new mechanistic model of bedrock channel morphology, I obtain analytical solutions for the response time scales of the channel for changes in bed cover, channel width and channel bed slope. The implications for bedrock channel dynamics, landscape evolution modelling, and stream profile inversion are discussed.