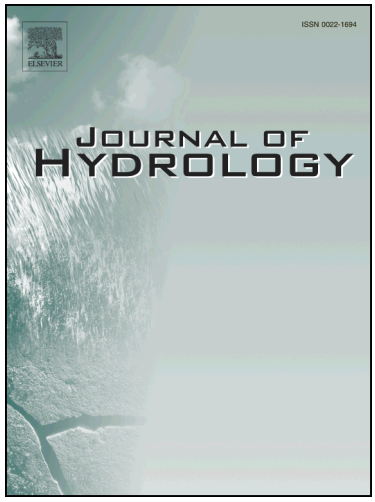

A network scale, intermediate complexity model for simulating channel evolution over years to decades

Roderick W. Lammers, Brian P. Bledsoe

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A network scale, intermediate complexity model for simulating channel evolution over years to decades

Roderick W. Lammers*, Brian P. Bledsoe†

Abstract

Excessive river erosion and sedimentation threatens critical infrastructure, degrades aquatic habitat, and impairs water quality. Tools for predicting the magnitude of erosion, sedimentation, and channel evolution processes are needed for effective mitigation and management. We present a new numerical model that simulates coupled river bed and bank erosion at the watershed scale. The model uses modified versions of Bagnold's sediment transport equation to simulate bed erosion and aggradation, as well as a simplified Bank Stability and Toe Erosion Model (BSTEM) to simulate bank erosion processes. The model is mechanistic and intermediate complexity, accounting for the dominant channel evolution processes while limiting data requirements. We apply the model to a generic test case of channel network response following a disturbance and the results match physical understanding of channel evolution. The model was also tested on two field data sets: below

*Department of Civil and Environmental Engineering, Colorado State University, Fort Collins, CO; Corresponding author: rodlammers@gmail.com

†College of Engineering, University of Georgia, Athens, GA