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

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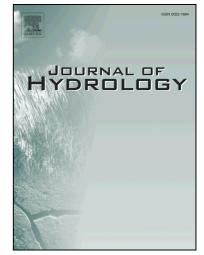
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Roderick W. Lammers, Brian P. Bledsoe[†]

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Abstract

Excessive river erosion and sedimentation threatens critical infras-6 tructure, 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. 9 We present a new numerical model that simulates coupled river bed 10 and bank erosion at the watershed scale. The model uses modified ver-11 sions of Bagnold's sediment transport equation to simulate bed erosion 12 and aggradation, as well as a simplified Bank Stability and Toe Ero-13 sion Model (BSTEM) to simulate bank erosion processes. The model is 14 mechanistic and intermediate complexity, accounting for the dominant channel evolution processes while limiting data requirements. We apply 16 the model to a generic test case of channel network response following 17 a disturbance and the results match physical understanding of channel 18 evolution. The model was also tested on two field data sets: below 19

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