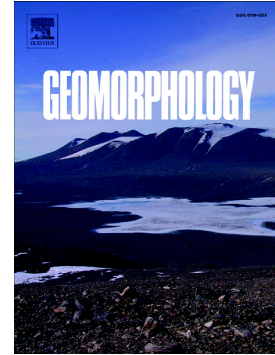


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Hydromorphodynamic effects of the width ratio and local tributary widening on discordant confluences

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Abstract

River training works performed in the last couple of centuries constrained the natural dynamics of channel networks in locations that include the confluences between tributaries and main channels. As a result, the dynamics of these confluences are currently characterized by homogeneous flow depths, flow velocities, and morphologic conditions, which are associated with impoverished ecosystems. The widening of river reaches is seen as a useful measure for river restoration, as it enhances the heterogeneity in flow depths, flow velocities, sediment transport, and bed substrates. The purpose of this study is to analyze the effects of local widening of the tributary mouth as well as the effects of the ratio between the width of the tributary and that of the main channel on the flow dynamics and bed morphology of river confluences. For that purpose, 12 experiments were conducted in a 70° laboratory confluence. In these experiments, three unit-discharge ratios were tested ($q_r = 0.37, 0.50,$ and 0.77) with two width ratios and two tributary configurations. The unit-discharge ratio is defined as the unit discharge in the tributary divided by that of the main channel, measured upstream of the confluence. The width ratio, which is

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