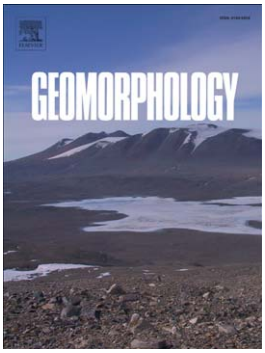

Dynamics of 30 large channel bars in the Lower Mississippi River in response to river engineering from 1985 to 2015

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Dynamics of 30 large channel bars in the Lower Mississippi River in response to river engineering from 1985 to 2015

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Abstract

Channel bars are a major depositional feature in alluvial rivers and their morphodynamics has been investigated intensively in the past several decades. However, relatively less is known about how channel bars in alluvial rivers respond to river engineering and regulations. In this study, we assessed 30-yr morphologic changes of 30 large emerged bars located in a 223 km reach of the highly regulated Lower Mississippi River from Vicksburg, Mississippi, to the Mississippi-Atchafalaya River diversion. Landsat imagery and river stage data between 1985 and 2015 were utilized to characterize bar morphologic features and quantify decadal changes. Based on bar surface areas estimated with the satellite images at different river stages, a rating curve was developed for each of the 30 bars to determine their volumes. Results from this study show that the highly regulated river reach favored the growth of mid-channel and attached bars, while more than half of the point bars showed degradation. Currently, the mid-channel and attached bars accounted for 38% and 34% of the total volume of the 30 bars. The average volume of a single mid-channel bar is over two times that of an attached bar and over four times that of a point bar. Overall, in the past three decades, the total volume of the studied 30 bars increased by 110,118,000 m^3 (41%). Total dike length in a dike field was found mostly contributing to the bar