

Long-term channel changes in the Mekong River: towards sustainable river channel management

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Abstract A channel-evolution model for calculating long-term channel changes of a meandering river was developed using an existing fluid-dynamic model, and was applied to quantify channel changes of two meandering reaches in the Mekong River. The novel point of the present work is the linking of a state-of-the-art meandering planform evolution model with observed morphological changes within large-scale sand-bed rivers in tropical monsoon regions, which are highly dynamic systems, and assessment of the model performance. Unstable reaches of the Mekong River could be identified from Hydrographic Atlas GIS data in 1992 and 1993 and remotely sensed images taken in 2004 and 2005. The instability caused: (i) bank erosion and accretion of meander bends, and (ii) movement or development of bars and changes in the flow around the bars. The remote sensing measurements indicate that maximum erosion occurred downstream of the maximum curvature of the river-centre line in both reaches. The channel migration coefficients of the reaches were calibrated by comparing remote-sensing measurements and model simulations. The difference in the migration coefficients between both reaches was assumed to depend on the difference in bank height rather than the geotechnical properties of floodplain sediments. Applications for sustainable river channel management of the Mekong River are discussed.

Key words channel change; Mekong River; river channel management; remote sensing; channel-evolution model