



Framework for a new model of the migration of meandering rivers

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Over the last 25 years, predictive models of river meander migration have mostly been based on the simple phenomenological model of Ikeda, Parker and Sawai (IPS), or a derivative thereof. According to the IPS model, the bank that erodes is the one toward which the thread of high streamwise velocity is biased. The erosion rate is connected to this bias via a dimensionless coefficient that can be determined only empirically. The opposite bank is assumed to deposit at whatever rate is necessary to maintain constant channel width. The IPS model has several problems. The model describes the mechanics of neither bank erosion nor bank deposition. The model assumes that constant width is maintained without showing why. Finally, the model is not directly connected to sediment transport balance within the stream itself. An attempt is made to correct these deficiencies in the context of a modified model framework. The new model framework formulates bank erosion and bank deposition separately, and provides a dynamic condition for the evolution of channel width as well as migration. Sample implementations of the model are presented.