



Analysing the relationship between channel curvature and river channel migration for meandering rivers in the United Kingdom

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The relationship between channel curvature and migration rate for meandering rivers has long been established and theoretical models use a weighted aggregate of local, upstream and downstream curvature to estimate migration rates. However, research has also suggested that instability is an inherent feature of meandering rivers and the chaotic behaviour of channel bends needs to be considered along with the basic controls of energy and resistance, to help better understand the patterns of behaviour in meandering channels.

Accurate historic mapping is widely available across the United Kingdom and provides the opportunity to examine the relationship between channel curvature and migration rate as it develops through the evolution of a meander bend. Many rivers can appear stable over short periods of time and a long term data set is required to fully understand meander behaviour.

This study tests the relationship between channel curvature and erosion rates in a number of active meandering reaches in three different catchments in the United Kingdom and examines the extent to which it fits theoretical patterns, whether different types of behaviour are apparent and whether the relationship is different between rivers. Width-averaged channel curvature and migration rate were measured for each bend in the reaches for each of the available map years and trajectories analysed. The results will be analysed within the meander behaviour framework proposed by Hooke (2003).

Results show a general increase in erosion rate as curvature becomes higher; however, the trajectory of single bends follows a complex pattern. The highest rates of erosion and channel curvature were measured in the River Lugg catchment, while the River Ribble catchment had the lowest erosion and curvature measurements. The highest rates of erosion were measured between 1955 and 1970. Further research is investigating the factors influencing the different types of behaviour.

References:

Hooke, J. M. 2003. River meander behaviour and instability: a framework for analysis. *Transactions of institute of British Geographers*. 28, 238-253.