Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08037, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08037
EGU General Assembly 2008

Cellular Modelling of River Meandering

T. J. Coulthard (1), J. Ramirez (1) and M. J. Van de Wiel (2)

(1) Department of Geography, University of Hull, Hull, HU6 7RX, U.K. (T.Coulthard@hull.ac.uk), (2) Department of Geography, University of Western Ontario, London, Ontario, N6A 5C2, Canada.

The past few decades have seen significant improvements in our understanding of the processes that lead to river meandering and braiding. Although fundamental questions as to the causes of the variety in river patterns remain, it is clear that there is a continuum of river patterns between straight, meandering and braiding. Yet there is a clear dichotomy in numerical models for these various channels types. Straight and meandering rivers are usually simulated using vector-based models, which elegantly capture the dynamics of single-thread channels, but which can not simulate multi-threaded channels. Conversely, braided channels are effectively simulated using cellular-based models, which use simple local rules to replicate the dynamics of the system, yet fail to replicate the lateral dynamics of meandering channels. This dichotomy unfortunately hinders the development of generic fluvial landscape evolution models and hampers the furthering of theoretical understanding of fluvial systems. Indeed, unifying meandering and braiding in one cellular modelling scheme has been proclaimed as the 'holy grail' of planform modelling.

In this paper we describe a meandering component within the CAESAR cellular numerical model that apparently allows the transition between braiding and meandering. Furthermore, this model also allows us to look at the controls on meandering such as flood frequency and magnitude, shear stress distributions, vegetation and grainsize.