



Modelling erosion, sediment transport and sedimentation in response to climate change – a three-dimensional river catchment model

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Climate change has the potential to impact many aspects of the natural world. Not least but rarely considered is the evolution of river systems and their impact on and place within the landscape. This project aims to validate the application of a cellular-automata model of physical river process to the explanation of the current state of a river catchment and its sediment characteristics. A cellular-automata structure lends itself particularly well to the long term landscape scale modeling of rivers as its computational overheads are relatively modest and it allows for the evolution of discrete landscape units based on their interaction with the surroundings.

The biggest problem in the establishment of this kind of physically based model as an explanatory tool is that there is an equifinality problem. There are a number of potential scenarios which could lead to the evidence seen in the field sites. Here we present sediment profiles which have been dated by a combination of techniques as the target output of the model. The model process are constrained by the reconstructed climate data derived from ice and ocean core Oxygen isotope information. These inputs limit the range of scenarios represented in the system.

This constrained system is then put through a range of minor variations in the initial conditions akin to a Monte Carlo simulation in order to develop a cloud of data-points for possible system trajectories. These clouds of data represent the probable behaviours and initial conditions of the studied basin.