



## What are the limits to quantifying landscape response to climate change?

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If we are to understand how changes in our future climate will influence our landscapes we can use the palaeo record to examine previous responses and numerical models to forecast future change. In terms of fluvial environments (e.g. river catchments and reaches) we have had notable success in simulating short, medium and long term responses to climate change but with some difficulties. These issues include finding suitable data to drive and validate the models – as well as integrating human and physical processes and feedbacks. Furthermore, when examining the palaeo record and the results of numerical modelling it is clear there is a large degree of non-linearity in fluvial response to climate change. Studies indicate that similar size floods may produce different size sediment yields due to sediment storage and supply. More recent work indicates that some aspects of fluvial response may exhibit self organised criticality (SOC) which may render it effectively unpredictable.

Therefore, whilst we may struggle to make better numerical models, and field interpretations – it may be more important to identify the level and scope of non-linearity in the systems themselves. Because if we believe that river systems are non-linear or exhibit SOC then the capability to model/predict is governed not by technology or model complexity but by the non linear dynamics of the system itself. Thus we need to determine the limits of our predictability – the extent and implication of non-linear processes in the natural system we are studying. This paper explores the implications of this for quantifying fluvial landscape responses to climate change and questions whether there are limits over which we will be unable to predict.