



What numerical models can and cannot tell us: Limitations on inferences in computational geomorphology

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Computer simulations and numerical experiments have become an increasingly important part of geomorphological investigation in the last decades. Process-based numerical models attempt to simulate real-world processes in a virtual environment which can be easily manipulated and studied. Conceptually, the experimental design of these simulation studies broadly falls in one of three categories: predictive modelling, explanatory modelling, and exploratory modelling. However, the epistemologies of these three modes of modelling are as of yet incomplete and not fully understood. Not only do the three modes of modelling have different underlying assumptions, they also have different criteria to establish validity and different limitations on the interpretations and inferences that can be made. These differences are usually only implicitly recognized, if at all, in computational geomorphology studies. This presentation provides an explicit, though not necessarily exhaustive, overview of the epistemological differences between the three modes of computational modelling, and of the limitations this imposes on what can and cannot be learned from simulation experiments.