



From archive to process in past fluvial systems

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The reconstruction of sediment fluxes through palaeo ecological systems is based on effect (sediment record) – cause (soil erosion, fluvial transport, sediment deposition) relationships using abduction as central methodology. In philosophy of science abduction means, that the effect of a palaeo process is known. e.g. a recent sediment body including specific properties of this archive. There are, however, potentially a range of laws that could be applied to explain the cause, e.g. a human or a climatic impact or internal system behaviour. From a methodological point of view this means that the coupling of cause and effect has to consider several potential starting points of the sediment flux system and a range of laws or explanations which increases the degree of uncertainty significantly. Particularly in modelling palaeo sediment flux systems no reliable transfer functions exist which translate sediment archive properties into flux processes. This general methodological challenge for reconstructing palaeo systems is a particular problem in fluvial systems. Fluvial systems act as a filter whose properties for past time scales are widely unknown. This represents a decoupled cause-effect relationship. The filter function of these system types means, that the external signal that drives the sediment flux record cannot be read directly from that record and that e.g. climatic hypotheses eventually are not testable. The methodology to link archive and process therefore requires spatially-structured storage and release models including abductive interpretation laws for internal feedbacks, thresholds and complex non-linear dynamics. Based on these arguments the aim this presentation is a discussion of a methodological framework in past fluvial system understanding.