



Self-Organized Criticality in River Basins: Challenging Sedimentary Records of Environmental Change

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For many years researchers have linked increases in sediment and bedload from drainage basins to external factors such as increased rainfall. However, natural systems have always shown a high degree of scatter or nonlinearity in this response, which has made prediction of sediment yields difficult. We identify and describe a mechanism for self-organized criticality (SOC) in the bedload sediment output from a simple drainage basin evolution model. This implies that identical floods will give considerably different sediment yields, which effectively renders the system unpredictable. Therefore, existing empirical methods for estimating sediment yields may need to be radically re-evaluated. Furthermore, sedimentary records used to infer past climate or environmental conditions could simply reflect the internal system dynamics instead of external drivers.