



Morpho-dynamics of mountain streams: from laboratory experiments to field observations

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Due to the complexity of mountain stream evolution and its causes, it is judicious to conduct flume experiments to better understand the morpho-dynamics of steep river channels. A series of long-term experiments under steady conditions revealed the high internal variability of transport processes (including erosion and deposition events). In particular, high fluctuations over time of the sediment volume stored in the channel (or released from the channel) were observed for the steepest channel experiments at intermittent transport conditions. These conditions imply an autogenic regulation of the sediment transport process. When these were extended to non-steady conditions, repeated flood events suggested a hysteresis effect on sediment transport but where the forcing frequency (of the repeated floods) plays an important role in the response of the channel system. The results are compared with preliminary field observations from continuous measurements in Swiss Alpine rivers. Simple mechanisms of steep river channel behavior are proposed.