

Response to the uplift of a single channel in mountain rivers: Laboratory experiments

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In considering the development of mountain rivers, it is very important to know about the developmental process and the dynamics of downward erosion and lateral erosion, although these are partially understood so far. A previous experimental study for channel networks described that lateral migration of surface reliefs became dominant after the erosion rate reached the uplift rate on the whole. This report came from the observation through photograph of the entire basin, and studies in individual channel scales are very few so far. The purpose of the present study is to elucidate relative strength of downward and lateral erosion of bedrock river when experienced uplift, using model experiments. We targeted the observation of a single channel for measurements with high accuracy.

Experiments were performed two times under almost the same condition (Experiments A & B). The uplifts were realized by removing weirs of 1cm at the downstream end. Experiment A was carried out for 300 minutes, during which the uplifts were generated when the river bed seemed stable.

Meanwhile, Experiment B was continued for 260 minutes, in which the uplifts were actualized at the same timings as Experiment A regardless of the channel state.

The results, with few exceptions, showed that the elevation of the channel bed at any places continued to lower by downward erosion until a knick-point passed through, and thereafter lateral erosion occurred while downward erosion almost ceased.

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