Effects of piedmont deposition on the development of experimental erosion landform

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The development experimental landform with rainfall-erosion and uplift is considered to be controlled by various factors, such as rainfall intensity, permeability and strength of material, and the width of deposition area. In order to understand the way of experimental landform development, effects of these factors should be examined individually. The effects of the width of deposition area surrounding the uplifted area (60 x 60 cm square) were examined by comparing runs with different deposition area. Specifications of those runs are listed below. Rainfall intensity are 80-90 mm/h and all runs are in the steady state phase**(Ouchi, 2015).

	deposition area	uplift duration	permeability	uplift rate
run27	10cm	960h	2.94cm/s	0.36mm/h
run32	20cm	1000h	1.84cm/s	0.36mm/h
run30	10cm	1160h	2.99cm/s	0.1mm/h
run31	20cm	1160h	4.68cm/s	0.1mm/h

In the first stage of experiments, fluvial erosion with the development of valley systems dominates in the uplifted area, and in the deposition area sediments deposit to form alluvial fans with frequently shifting the place of deposition. Sections of alluvial fans observed after the experiments reveal that those alluvial fans advance with keeping nearly constant gradient of deposition surface. After alluvial fans fill the area of deposition, the area becomes the area of transport and this accelerates fluvial erosion in the uplifted area. Valley incision into the uplifted area increases the area of slopes and as aresult promotes slope failures. Slope failures occur frequently and dominate the landform change after relief reaches a certain height. Channels become conduits of sediments produced by slope failures, and the average height becomes rather stable. This stable average height indicates the achievement of balance between erosion and uplift height (stady state).

Wider deposition area requires longer time of alluvial fan development to fill the area, and this helps prolonging the period of fluvial erosion and slowing the development of valley systems. Relatively slow valley incision and prolonged period of fluvial erosion allow the uplift increase the height of sand mound. The average height of uplifted area after becoming stable is higher with wider deposition area. The height of fan apex, which determines the base level of erosion in the uplifted area is higher with wider deposition area. After the deposition area turns into the area of transport, landform changes look similar regardless of the width of deposition area. Shapes of longitudinal channel profiles show good similarity despite the difference in deposition area, except for their height and length. Ridges, however, tend to be separated in the run with narrower deposition area, probably because accelerated fluvial erosion during the period of lower relief promotes the development of wide and shallow valleys.

**Ouchi, S. 2015. Experimental landform development by rainfall erosion with uplift at various rates. Geomorphology 238: 68-77.

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