

Giant Qianjincun landslide in the Nu River and the impact on transient landscape evolution in southeastern Tibet

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Landslides frequently occurred in deep-incised valleys during the topographic development of the Tibetan Plateau, which commonly blocked rivers and in turn affected fluvial processes. The giant Qianjincun landslide, located in the Hengduan Mountains in southeastern Tibet, severely dammed the river with a height of ~175 m, which created the highest extant landslide dam along the trunk of the Nu River. The deposits remaining in the valley indicated two landslides from multiple failure sources. The Geduicun landslide on the right bank evolved from gravitational deformation of toppling, while the Qianjincun failure on the left hillslope was governed by the seismic-triggered detachment of granite. In comparison to the soft rock failure preceded by long-term gravitational effect, the large-scale mass movement on the granite slope catastrophically induced the prevailing river blockage, that resulted in stronger transient landscape evolution than any other landslides in the catchment. Inventory of river-damming landslides compiled over the overall trunk of the Nu River allowed the power-law correlations among the geomorphic parameters of dams. Geomorphology and geology of giant landslides in landslide-prone valleys can offer a better understanding of landscape feedbacks between landslides and fluvial processes.

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