

The Experiment of Alluvial Fan Evolution Induced by Debris-Flow Tributary

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Rainfall events with high intensity cause many landslides, slope avalanches and debris flows in Taiwan. As a debris flow flows from a tributary to mainstream, an alluvial fan usually forms at the confluence. Villages and infrastructures adjacent to these alluvial fans are in high risk. The more understanding of the morphological processes of alluvial fans need to be explored for the disaster prevention.

A simplified laboratory experiment is conducted in this study to simulate the morphological process of alluvial fans formed by debris flows at the confluence. The tributary is set to be perpendicular to the mainstream with mobile bed. In fixed volume of debris flow, sediment concentration of debris flow is modified by the different water volume. In mainstream, discharge is altered in distinct amount to erode the accumulation of the debris flow at confluence. By using Particle Tracking Velocimetry (PTV) method, velocities of mainstream and tributary are measured. The impact of flows velocities at confluence can be observed to analyze.

During the process of deposition, the real-time morphological change is recorded by using images analysis. Cameras from different angles of views are used to monitor process. The Digital Terrain Model (DTM) is built to observe morphology elevation evolution through time by Digital Photogrammetry. The results show that experiments might reach a dynamic equilibrium elevation in late stage from an initial stage of elevation growth.