

Relationship between the landslide distribution and the drainage basin morphology: case from Typhoon Morakot

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ABSTRACT

Landslide is a highly destructive geological event, could be triggered by many factors. For a territory situated in an active orogenic belt, because of the intense incision rate associated with river erosion, the morphological factor becomes the most common one for triggering landslide. The river plays an important role for understanding the evolution of landslide. This study aims to realize the relationship between the landslides triggered by Typhoon Morakot and the drainage basin morphology.

On the 8th of August 2009, Typhoon Morakot caused multitudinous landslides in the Central and Southern Taiwan. In this study, morphology from the Chenyoutan River to the Shuaimang River was analyzed to obtain the indices of concavity, steepness and normalized steepness. In addition, the aero-photos acquired after Typhoon Morakot were used to calculate the area of landslide and the ratio of landslide in each drainage basin. Our result shows that for an area with a higher tectonic uplift rate, the landslide ratio is also higher. A possible explanation is that a higher uplift rate might cause the terrain to become relatively unstable in the basin. During a typhoon event, even under the same weather condition, a higher landslide ratio could be occurred in a higher uplifted drainage basin.

Keywords: Typhoon Morakot, drainage basin, landslide ratio, concavity index, steepness index, normalized steepness indices