



## **The Influence of Geological Structures on the Initiation of Large Landslides: An Example from Hsiaolin Landslide Induced by Typhoon Morakot in 2009, Taiwan**

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Hsiaolin landslide locates at Hsiaolin village in Kaohsiung county, southern Taiwan. The landslide occurred at 06:17 on 9th of August. 450 peoples were buried in the landslide, and over 27 millions m<sup>3</sup> debris slides down and formed a landslide dam with a height 30 to 35 m above river channel to block Chishan River, and it broke at 7:00 on August 9. Most of buildings in Hsiaolin village build on the river terraces with elevation about 10 m above the river bed, and most of them were buried by the debris of landslide, and the residuals were washed out by flooding when landslide dam breakage.

Two folds (Hsiaolin syncline and unnamed anticline) and two faults (Chiahsien fault, and Wulipu fault) are recognized in Hsiaolin area. All the structures trend in NNE-SSW except for the WNW-ESE trending Wulipu fault. The Hsiaolin syncline which axis locates close to the Hsiaolin village is an open, northern plunged syncline. The Chiahsien fault is composed of several N-S trending, 40o-50o western dipping thrusts with minor amount of left-lateral strike-slip motion. The Wulipu fault is a WNW-trending high angle fault with significant right-lateral strike-slip motion.

The Hsiaolin landslide is recognized as a wedge type of failure. The failure wedge is mainly formed by NNE-trending bedding plane of Pliocene-Miocene Tangenshan Sandstone and WNW-trending high angle fractures which have similar attitude to that of the Wulipu fault. The Chiahsien fault passes through the middle part of landslide. Field measurement shows significantly increasing of fracture density at place nearby Chiahsien fault which provides excellent path for fluid flow during heavy rainfall. Therefore, great fluid pressure associated with decreasing the rocks strength in area nearby Chiahsien fault is proposed to be the main factor to initiate the landslide in haevy rainfall. After failure initiation, landslide is enlarged upward and a wedge type of failure occurred due to lose support in the middle of hill slope.