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Characteristics of deep-seated catastrophic landslide in a valley, movement process, and determination of deposition hazard area

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During extreme rainfall, deep-seated catastrophic landslide is a frequent mishap in main stream and tributaries of Taiwan. Reviewing the histories of Taiwan landslide events, as a large and deep-seated rock/soil mass of simultaneous movements in a valley, it might cause serious disasters. Reviewing the present literatures, there are morphological indications that the potential deep-seated catastrophic landslide can be track and find. Especially, the slate slope is influenced by weathering and gravitation for a long time, it become weak and it may cause the sliding slope creep and folding rock that will become the sliding surface of deep-seated catastrophic landslide. But analysis deep-seated catastrophic landslides for disaster preparedness and response planning are sometimes inadequate due to the complexity of such slopes.

Whereas, this study mainly focus on deep-seated catastrophic landslide in valley. The study area has chosen Xiandushan Mountain, the 115.9 k of Suhua highway, and Zhuoshui River which to discuss the characteristics of deep-seated catastrophic landslide in a valley, movement process, and deposition hazard area. Base on the past events of deep-seated catastrophic landslide, the geological investigation, morphological analysis, and remote sensing technology will helpful to induce the geological characteristics and the morphological evolution. Besides, the deep-seated catastrophic landslide events will simplify to set up the physical modeling, its interpret the variation conditions to influence the characteristics, movement process, and deposition hazard area for deep-seated catastrophic landslide. The results of physical modeling were compared with those produced by numerical analysis (Application of discrete element method by PFC3D program) so that the correctness of the numerical simulation could be justified. Subsequently, calibrated numerical methods adopted in the small-scale model were used to simulate the full-scale model. The simulation results should be as close to reality as much as possible. Finally, several landslide cases will be simulated and the results can provide reference for disaster prevention, mapping and zoning of geological hazard susceptible areas, and associated renovation project planning.

Keywords: deep-seated catastrophic landslide, the geological characteristics, the physical modeling, discrete element method.