



## Assessment and Survey of Potential Catastrophic Landslides by Using Geomorphometric Analysis

Yu-Chung Hsieh (1,2), Chin-Shyong Hou (2), Jyr-Ching Hu (1), Yu-Chang Chan (3), Li-Yuan Fei (2), Hung-Jen Chen (2), and Cheng-Lung Chiu (2)

(1) National Taiwan University, Department of Geosciences, Taipei, Taiwan (jchu@ntu.edu.tw), (2) Central Geological Survey, MOEA, Taipei, Taiwan, (3) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan

In recent years, extreme weather events have induced more frequent geological hazards in Taiwan. The heavy rainfall brought by the Typhoon Morakot has triggered a large amount of landslides. The most unfortunate case occurred in the Hsiaolin village which was totally demolished by a catastrophic landslide in less than a minute. The study of such catastrophic landslides is urgently needed to mitigate loss of lives and properties in the future. Traditionally, the study of landslides usually includes shallow landslides, rockslide, and debris flow etc. and is commonly made use of satellite images, aerial photos, coupled with field surveys. It is considered that the creep phase of a landslide is a progressive stage of failure and gives sufficient signals before turning into a catastrophic landslide. Due to lack of high quality terrain data, however, the research of catastrophic landslides has been time consuming with often unsatisfactory results. This study used high-resolution airborne LiDAR-derived DEM data from the Central Geological Survey, MOEA. Different geomorphometric analyses were applied to process the high resolution and high accuracy DEM data including the hillshade, aspect, slope, eigenvalue ratio (ER) & openness. Among the geomorphometric analyses, combining the characteristics of openness, slope and hillshade gives a clear advantage to distinguish and analyze regions of potential catastrophic landslides in many cases. Statistical and image processing techniques to quantify morphological and other aspects of the terrain surface are also employed. Our results indicate that over hundreds of potential catastrophic landslides may present in southern Taiwan after the Typhoon Morakot event. The quantitative methods used in this study highlight the terrain features of the creep phase of catastrophic landslides and is helpful for landslide feature interpretation and hazard assessment.