

Topics: Remote Sensing Applications (Land Use/Land Cover)/ Change Detection
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Historical Aerial Photographs Used for Analyzing Topographic Changes of Hsiaolin Landslide Area

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Abstract: Typhoon Morakot attacked Taiwan on 6th August 2010 and exhibited a historical record of accumulated rainfall of 2854 mm in 3 days. Hsiaolin Village was smashed by the massive debris flow originated from the deep-seated Hsiaolin Landslide. Unanimously, the trigger factor was rainfall. Nevertheless, there have been a lot of debates with controversial remarks about the cause of the deep-seated landslide. The purpose of this study is to check the land surface evidences related to pre-cludes of the landslide with historical aerial photographs. In total, 15 aerial photographs in 6 years are used in this study, i.e. 1966, 1982, 1988, 2002, 2005, and 2007. Firstly, parameters of Interior Orientation for various types of aerial camera are applied. Then, orthophotos of the area acquired right before Morakot Event are used for geodetic control and airborne LiDAR digital surface model (DSM) acquired in 2005 are used for vertical control. Thirdly, all stereo-pairs of various years are used to generate DSM and orthophotos for the respective year. Finally, comparisons of the orthophotos and DSM in various years are made to check the topographic change in sequence of time. The accuracy of aerial triangulation is around one meter. No ground cracks or fissures can be observed before Morakot Event. This may imply that no obvious deformation took place before the Event or the deformation features were hidden by forest cover. Nevertheless, it was observed that the outer shape of deforestation area on 1988 photos coincided with the crown area of the deep-seated landslide. Further observation of the large-scaled landslides in the neighborhood revealed that the crown boundaries are mostly coincided with deforestation boundaries. This may indicate a link between activities of deforestation and deep-seated landslides for this study area.