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Unmanned Aerial Vehicle (UAV) associated DTM quality evaluation and hazard assessment

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Taiwan, due to the high seismicity and high annual rainfall, numerous landslides triggered every year and severe impacts affect the island. Concerning to the catastrophic landslides, the key information of landslide, including range of landslide, volume estimation and the subsequent evolution are important when analyzing the triggering mechanism, hazard assessment and mitigation. Thus, the morphological analysis gives a general overview for the landslides and been considered as one of the most fundamental information. We try to integrate several technologies, especially by Unmanned Aerial Vehicle (UAV) and multi-spectral camera, to decipher the consequence and the potential hazard, and the social impact. In recent years, the remote sensing technology improves rapidly, providing a wide range of image, essential and precious information. Benefited of the advancing of informatics, remote-sensing and electric technologies, the Unmanned Aerial Vehicle (UAV) photogrammetry mas been improve significantly. The study tries to integrate several methods, including, 1) Remote-sensing images gathered by Unmanned Aerial Vehicle (UAV) and by aerial photos taken in different periods; 2) field in-situ geologic investigation; 3) Differential GPS, RTK GPS and Ground LiDAR field in-site geoinfomatics measurements; 4) Construct the DTMs before and after landslide, as well as the subsequent periods using UAV and aerial photos; 5) Discrete element method should be applied to understand the geomaterial composing the slope failure, for predicting earthquake-induced and rainfall-induced landslides displacement. First at all, we evaluate the Microdrones MD4-1000 UAV airphotos derived Digital Terrain Model (DTM). The ground resolution of the DSM point cloud of could be as high as 10 cm. By integrated 4 ground control point within an area of 56 hectares, compared with LiDAR DSM and filed RTK-GPS surveying, the mean error is as low as 6cm with a standard deviation of 17cm. The quality of the UAV DSM could be as good as LiDAR data, and is ready for other applications. The quality of the data set provides not only geoinfomatics and GIS dataset of the hazards, but also for essential geomorphologic information for other study, and for hazard mitigation and planning, as well.