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Environmental evolution and Landslide hazard assessment based on UAS multi-sensors

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Taiwan, due to the high seismicity and high annual rainfall, numerous landslides triggered frequently, thus caused severe social impacts. Landslides pose long-lasting threats to humans and their property and are detrimental to the environment in general. The vigorous development of geospatial information technology has not only achieved good results in land monitoring, but has also been gradually extended to other application fields. Hazards monitoring is one of the important applications. Geospatial information can be obtained through surveying and mapping technology, and through multi-temporal geospatial data, the production, migration and migration of debris deposits can be quantitatively evaluated in a reasonable time and space in catchment scale. In recent years, the development and integration of MEMS technology has contributed to the rapid development of UAV measurement. This goal can be achieved due to the advantages of UAVs, such as efficiency, timeliness, low cost, and easy operation in severe weather conditions. The real-time, clear and comprehensive low- and middle-altitude photos of the area can be used as the most basic and important spatial information for research and analysis.

Based on the aforementioned technologies, some specific potential landslides situated in the Laonongshi Stream southern Taiwan was been assigned. In order to evaluate potential hazards and hazard monitoring, multi-temporal high precision terrain geomorphology in different periods is essential. For these purpose, we integrate several technologies, especially by unmanned aircraft system imageries and existed airphotos, to acquire and to establish the geoinfomatic datasets. The methods, including, (1) Remote-sensing images gathered by UAS and by aerial photos taken in different periods; (2) UAV LiDAR acquired in different periods; (3) field in-situ ground control points and check points installation and geomatic measurement; (4) 3D geomorphological virtual reality model construction; (5) Geologic, morphotectonic and landslide micro-geomorphologic analysis; (6) DEM of difference from multi-temporal dataset to evaluate the topographic and environment changes. We focused on the potential large-scale deep-seated landslides, acquired high-precision and high-resolution DTMs, proving as the essential geoinformatic datasets, so as able to monitoring the slope behavior and to decipher the potential landslide hazard, sediment budgets and the consequence of social impact. The results show that there are still landslide activities in different periods and regions within the study area; different sections of the river channel also have different degrees of siltation or erosion. Therefore, regular monitoring and potential

assessment are necessary. The developing methods may apply for other potential large-scale landslide monitoring and assessment in Taiwan, and in world as well.