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GENERATION OF DEM FROM NON-METRIC CAMERA IMAGES OVER MOUNTAINOUS AREAS

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During the annual rainy season in November 2003, a series of landslides occurred at several spots along the only access road leading to Gunong Raya, the highest mountain in Langkawi Island , Malaysia cutting off communication to the summit. As part of the effort to identifying these areas, aerial phot ography was conducted using a 6.0 mega pixel n on metric d igital camera at a flying height of about 900 m over the affected mountainous are a. The aerial digital images were captured with an overlap of least 60%. In this paper, the generat ion of DEM from such n on-metric images was investigated. The investigation is confined to a single model of the 1: 4000 scale photography derived from a pair of n on metric images of size 1440 x 2160 pixels with pixel size of 10.5 • m. The camera was calibrated before and after the images was taken. A well developed area with dimension of 0.3km by 0.3km around the summ it was chosen as the test site for this investigatio n. The test site has several b uilding complexe s surrounded by a well defined terrain with the highest poi nt having an altitude of 900 m above mean sea le vel. The height differences between the highest and the lowest point in this site is about 60 meters. For the horizontal control, a total of 14 well distributed points were observed using the rapid static GPS approach. Some of these GPS points are later used as the GCP for the formation of the 3D model of the test site. Due to the unavailability of d etailed height information of the site, a leveling survey over t he test site was conducted resulting in point height accuracy of 5 mm. The DEM derived from this survey is used as the reference DEM for the performing analysis. The creation of the 3D stereo model of the test site was carried out using the DVP® software version 5.5. Two method of DEM generation were adopted; the auto -correlation method and the manual method. Since the images are of the non metric type with no fiducial marks, the four corners of the images were adopted for the interior orientation. In generating t he DEM, grid spacing of 1m resulting in 125 points were used. Many combinations of the GCP points were used in forming the 3D model with the final 3D model adopted for further analysis using 10 GCP points which are well distributed throughout the test site . The DEM generation method and its associated problems, test results and comparison with terrestrial measurements are described here. The test results indicate that the est imated accuracy (r.m.s) of 0.3m can be achieved in the DEM generation.