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TROPICAL AIRBORNE LiDAR FOR LANDSLIDE ASSESSMENT IN MALAYSIA: A TECHNICAL PERSPECTIVE

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Abstract

Malaysia has faced a substantial number of landslide events every year. Cameron Highlands, Pahang is one of the badly areas affected by slope failures characterized by extreme climate, rugged topographic and weathered geological structures in a tropical environment. A high frequency of landslide occurrence in the hilly areas is predominantly due to the geological materials, tropical monsoon seasons and uncontrolled agricultural activities. Therefore the Government of Malaysia through the Prime Minister Department has allocated a special budget to conduct national level hazard and risk mapping project through Minerals and Geoscience Department Malaysia, the Ministry of Natural Resources and Environment.

The primary aim of this project is to provide slope hazard risk information for a better slope management in Malaysia. In addition this project will establish national infrastructure for geospatial information on the geological terrain and slope by emphasizing the disaster risk throughout the country.

The areas of interest are located in the three different selected areas i.e. Cameron Highlands (275 square kilometers), Ipoh (200 square kilometers) and Cheras Kajang – Batang kali (650 square kilometers). These areas are selected based on National Slope Master Plan (2009 – 2023) that endorsed by Malaysia Government Cabinet.

The national hazard and risk mapping project includes six parts of major tasks: (1) desk study and mobilization, (2) airborne LiDAR data acquisition and analysis, (3) field data acquisition and verification, (4) hazard and risk for natural terrain, (5) hazard and risk analysis for man-made slope and (6) Man-made slope mitigation/preventive measures. The project was authorized in September, 2014 and will be ended in March, 2016.

In this paper, the main focus is to evaluate the suitability of integrated capability of airborne- and terrestrial LiDAR data acquisition and analysis, and also digital photography for regional landslide assessment. The results of the study produced 4 point/m^2 density of LiDAR data point cloud, very detailed DEM and DSM of 0.5 m grid and high resolution digital aerial photograph of 7 cm grid, as well as an inventory of the landslide. A reliable landslide inventory has been critically developed with the input of LIDAR derivatives data and field investigation emphasizing on its crucial attributes, e.g., the landslide types, depth, style-, states and distribution of landslide activity.

As a result of this study, guidelines and recommendation on the technical aspect of LIDAR-derived landslide assessment are explicitly presented and critically discussed. The finding of this project will be very useful for future planning of slope management, sustainable land use planning and development by related government agencies and local authorities in Malaysia.

***Keywords*:** Airborne LiDAR; landslide assessment; hazard and risk analysis; 3D point cloud density; slope failures; Malaysia