**ASIAN CONFERENCE ON REMOTE SENSING (ACRS 2014)**

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**Suggested Topic/ Sub-topic:**

New Generation Sensors and Application/ LiDAR

**Paper Title:**

HYPERSPATIAL RESOLUTION OF GROUND BASED REMOTE SENSING FOR NATURAL LIMESTONE CHARACTERIZATION: A CRITICAL INPUT FOR ROCK SLOPE HAZARD ASSESSMENT IN THE TROPICS

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**Abstract**

An accurate and rapidly observed rock-cliff mapping is a step forward for a better hazard and risks assessment of natural limestone in the tropics. The use of advanced and modern mapping technology is crucial in assessing the stability and deformation of the rock slope. Rock-falls are typical geological disaster on steep slopes often resulted an impact to economic, human life and environmental issues. A combination of climatic, topographic and vegetation factors contributes to the initiation of rock-fall processes in a tropical environment. The rock-mass characteristics in particular the discontinuity properties, e.g. joints, bedding planes and fractures determine the possible unstable blocks leading to rock-fall activity.

This collaborative research provides a better new insight into the use of very Long Range Terrestrial Laser Scanning (LRTLS) system captured at 1400 m and 4000 m to accurately map the rock slope characteristics of weathered tropical limestone. The method is also capable of extracting discontinuity orientations and positions on the rock face made it possible to reconstruct the rock-mass and identify hazardous blocks in the slope.

Interestingly, we developed a methodological framework addressing the data preliminary-, collection-, processing- and analysis stage for rock-cliff stability assessment in the equatorial region. We critically discussed some practical and limitation issues on the use of LRTLS system to map and characterize the hazardous natural limestone in Batu Caves (Selangor, Malaysia) – an iconic touristic place characterized by 400 million years old limestone. The seamless integration of calibrated high-resolution digital color images with high-density LIDAR scan data allows an accurate characterization of rock-mass to improve the quality of rock slope stability analysis. Remarkably, this is a first attempt to objectively map the natural limestone and produce the rock-cliff derived hyperspatial resolution data for geomechanics, rockfall analysis and geotechnical risk assessment using a revolutionary, remotely advanced laser mapping technique in Malaysia.

**Keywords**:

Long Range Terrestrial LIDAR; Rock slope assessment; Geo-structural survey; Vegetated Limestone; Batu Caves Selangor;