Topographic openness algorithm for characterizing geologic fractures of Kuala Lumpur limestone bedrock using DEM.

ABSTRACT

This study presents a modified approach to delineate and map subsurface geological fractures in karst terrain using two geomorphometric parameters from DEM-derived raster maps of slope and topographic openness. Slope and topographic openness were calculated by first and second derivates of a 25m DEM. These parameters may lead to geologic interpretation of subsurface geologic fractures because the differential surface process of slopes creates landforms with different shape and sizes. The slopes and topograhic openness algorithms perform poorly in the areas of low relief and low slopes. To overcome this problem, a modified method in terms of applying Sobel filter and equalization enhancements to the raster maps of slope and topographic openness maps were applied. The modified method has proven to be better for discrimination of surface signatures of buried geological fractures. This technique has been applied to the Kuala Lumpur limestone bedrock to quantify the spatial patterns of buried geologic fractures. I has been observed that the subsurface geologic fractures have different geomorphometric characteristics and spatial patterns. Their orientations were found to be dominantly in the NW-SE, NE-SW, NNE-SSW, NNW-SSE and WNW-ESE directions. The occupy an area of about 9.243 km2 out of total of limestone, which is approximately 254.319 km2. Understanding the causes of unpredictable piling problems can point to considerable solutions and suggest new methods on the characterizing of the landform and geotechnical engineering problems. This study permits better understanding of the geotechnical engineering setting of Kuala Lumpur limestone bedrock.

Keyword: Kuala Lumpur limestone; Buried geologic fractures; Unpredictable piling problems.