Lineaments and their association with landslide occurrences along the Ranau-Tambunan road, Sabah

Abstract

The purpose of this study is to assess the influence of lineaments on landslide occurrences based on the concept of lineament density. The Ranau-Tambunan districts with a 54 km road stretch from Ranau to Tambunan, crossing the Crocker and Trusmadi Formations is selected as the study area. In total, the study area is 844.7 km2. Both formations have similar area with Crocker at 405.5 km2 and Trusmadi at 425.6 km2. The rest are either igneous and alluvium (13.6 km2). The lineaments were identified using a 5×5 weighted kernel filter on a RADARSAT-1 standard mode image. The lineament density was calculated using a 1 km × 1 km grid on the lineament map and the density for each 1 km2 grid is represented by the total length of lineaments in a grid. Atotal of 334 lineaments were identified with the lineament density map classified into three classes of density, resulting low (<318-m), moderate (319-775-m), and high (>775-m) using the natural break classification. The lineament density is more pronounced in the Crocker compared to the Trusmadi Formation. The influence of lineament on landslide occurrences was examined by overlapping the lineament density map with 75 landslides observed from fieldwork to determine the number of landslides in each density class. Out of the 75 landslides, 29 landslides occurred in the Crocker Formation and the other 46 landslides in the Trusmadi Formation. From the overlapped, a total of 47 landslides (63%) were captured into the high density class with 19 and 28 landslides in the Crocker and Trusmadi Formations respectively. These results indicate over half of the landslide occurrences are induced by the presence of lineaments with the highest percentage of landslides occurring in the Crocker Formation. As a conclusion, this study found that using the grid technique is an effective way to determine lineament density and quantify its influence on landslide occurrences.