



Spatial distribution difference of slope failures induced by typhoons in a lateritic-gravel tableland, Linkou, northern Taiwan

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Linkou Tableland, originating from a Pleistocene alluvial fan in the northern Taiwan, is characterized by many flat-boat-bottom-shaped valleys with steep valley side and numerous gullies. Only a small portion of original surface (200 m in height), capped by a lateritic veneer, is preserved. This 190 km² tableland is subject to shallow landslides and gully erosion, especially in the area outcropping with unconsolidated terrace gravels and poorly cohesive sand-shale alternations. Based on the interpretation of sequential aerial photographs, it is found that the spatial distribution of slope failures within this tableland induced by two major typhoons is distinct. Slope failures triggered by Typhoon Cecil in 1982 appeared mostly in the eastern and northern area of the Linkou Tableland, while those induced by Typhoon Nari in 2001 were more widely distributed though with lower frequency per square kilometer. It is believed, in addition to the morphological and geological factors (i.e., slope gradient, drainage frequency and the proportion of terrace-gravel outcrop), rainfall characteristics of these two typhoons also played an important role. Short but extremely intensive rainfall during Typhoon Cecil (373 mm with max. intensity 120 mm/hr) concentrated in the northern half of the tableland, while the prolong but less intensive rainfall during Typhoon Nari (876 mm, 73 mm/hr) was more widely spread. It also explains the extremely high frequency of reworked gullies (43.2 per square km) in the eastern area, which is characterized by the relatively high drainage frequency, was only triggered by Typhoon Cecil. This case implies that the data set chosen for validating the equation derived from statistical techniques for landslide susceptibility zoning should be more carefully assessed.