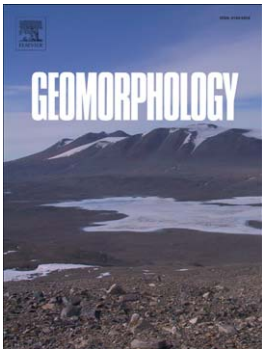

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Regional landslide susceptibility assessment using multi-stage remote sensing data along the coastal range highway in northeastern Taiwan

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Abstract

Typhoons Megi (2010) and Saola (2012) brought torrential rainfall which triggered regional landslides and flooding hazards along Provincial Highway No. 9 in northeastern Taiwan. To reduce property loss and saving lives, this study combines multi-hazard susceptibility assessment with environmental geology map a rock mass rating system (RMR), remote sensing analysis, and micro-topography interpretation to develop an integrated landslide hazard assessment approach and reflect the intrinsic state of slopeland from the past toward the future. First, the degree of hazard as indicated by historical landslides was used to determine many landslide regions in the past. Secondly, geo-mechanical classification of rock outcroppings was performed by in-situ investigation along the vulnerable road sections. Finally, a high-resolution digital elevation model was extracted from airborne LiDAR and multi-temporal remote sensing images which was analyzed to discover possible catastrophic landslide hotspot shortly. The results of the analysis showed that 37% of the road sections in the study area were highly susceptible to landslide hazards. The spatial distribution of the road sections revealed that those characterized by high susceptibility were located near the boundaries of fault zones and in areas of lithologic dissimilarity. Headward erosion of gullies and concave-shaped topographic features had an adverse effect and was the dominant factor triggering landslides. Regional landslide reactivation on this coastal highway are almost related to the past landslide region based on hazard statistics. The final results of field validation demonstrated that an accuracy of 91% could be achieved for forecasting geohazard followed by intense rainfall events and typhoons.