Geophysical Research Abstracts
Vol. 20, EGU2018-2317-1, 2018
EGU General Assembly 2018

The Prediction Model of Fluidized Landslide on Village-Side Hillslope in the Mountain Area of Southern Taiwan

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Many villages located in the valley surrounded by the mountain in Southern Taiwan. Fluidized landslide (FL) occurred frequently from adjacent slopeland in extreme weather condition and is prone to high damage to the village. For the hazard prevention, we developed a new delineation method of the landslide unit for FL prediction analysis. The delineation method considered the micro topography of hillslope which surrounded the village. The slope, gully, and hollow units were distinguished for each hillslope. Those units with area great than 1.5 hectare are considered as assessing units. The prediction model was then applied to differentiate FL / landslide unit.
Two FL prediction models, for slate and sedimentary rock area, are constructed based on FISHER discrimination methodology including 55 FL and 55 non-FL inventories induced by typhoon events. Fluidized landslide inventories, occurred in the 2009 Typhoon Morakot and other extreme rainfall events in southern Taiwan, were identified by field reconnaissance and aerial photo recognition. The FL recognition model consisted by 7 variables, including effective watershed area index topography, average channel gradient of the transport segment, form factor rate, depression ratio of the transport segment, average width of the initiation segment, and average gradient of watershed, and landslide susceptibility factors. The classification rate of models reached 87.5%.
Furthermore, we applied those models to predict the fluidized landslide on 8 village-side hillslopes to test the efficiency of prediction. 5 villages located in slate area and 250 landslide units have been delineated out. 3 villages located in sedimentary rock area and 106 landslide units have been achieved from the delineation.The analysis database consisted of 7 factors of 356 units was developed to fulfil the predicting assessment.
Results show that 12 FLs in a total of 14 FL events was correct prediction in slate area, the FL capture rate is 86%; 11 FLs in a total of 14 FL events was predicted in sedimentary rock area, the FL capture rate is 79%. Results of the prediction show two models have reasonable applicability to villages in slate and sedimentary rock areas. It is expected that the prediction model will improve the efficiency of prevention on FL type landslide disaster.