

Assessment of runout path and deposition area of potential landslide in Lushan Settlement, Central Taiwan

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Our study focused on the Lushan Settlement, located in the slate belt of Central Range in Taiwan. We adopted L-band ALOS SAR data to generate the line of sight (LOS) velocities in study area using PS-InSAR technique constrained by continuous GPS data in the period from 2007 to 2010. The result revealed a subsidence rate in LOS up to -15 mm/yr. In addition, the borehole inclinometers, installed by Central Geological Survey, recorded a slip depth more than 120 m just in the northeastern of the village. Based on the results of PS-InSAR, records of inclinometers and field geological study, we adopt 2-D and 3-D numerical simulations by using Particle Flow Code to investigate scenario-based runout paths, particle velocities and landslide-affected area, which are useful information for decision support and future landslide hazard assessment. We analyzed different scenarios based on a dipping of the potential sliding surface varying from 20 to 5 degree. In each scenario, sliding of the unstable slope with a high frictional coefficient of the subsurface implied that the sliding surface of this creeping slope has still been developing. Furthermore, with 3-dimentaion models we analyzed the runout paths of rock mass, velocities of movement, and catastrophic landslide-impact area in the scenario that once the sliding surface fully develops or shear failure happens. Generally, the total runout distance could be more than 400 m, and the largest debris thickness might reach 100 m. Because of a low dipping angle of the sliding surface, the movement could last several minutes with a maxima velocity about 2 m/s. Moreover, a landslide-dam will form and capacity of dam could be predicted. In the worst case, the settlement, which is on the slope crown, might be destroyed and buried by debris.