The Landslide Mechanism of a Dip-slope at Herya, Taiwan

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Immediate after the Chi-Chi earthquake, 1999, a tension crack approximately 80 meter long and more than 3 meter deep was found after a heavy rain at the Herya area in Central Taiwan. The cause for inducing the tension crack cannot be identified as earthquake or rainfall. Field investigation and a total of 8 boring holes with depth ranging from 20m to 80m were conducted to study the potential and possible mechanism of the dip-slope sliding. The geomorphological analysis and field investigation suggested the existence of several approximately parallel blocks to form slipping in sequence of the overall landslide area. The geological formation is composed of thick sandstone with thin interlayers of siltstone. A hypothesis is proposed that a set of high dip angle joint lead the way for rainfall deep into the formation, which perched on the less permeable siltstone and weaken the formation. The dip-plane sliding would occur along the thin layers of weaken siltstone with a major sliding plane at depth of about 60-70m and several minor sliding plans at various depths. Field monitoring system including a rain gauge, extensometers, slope indicators, water pressure transducers and time domain reflectometer (TDR) was installed to monitor the potential landslide. According to the monitoring results, the displacement positions are consistent with the depths of dip-slope landslide hypothesis. Moreover, the factors for inducing dip-slope landslide in Herya were analyzed using numerical method.