Geophysical Research Abstracts, Vol. 9, 06976, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06976

Structural and geomorphic controls on the earthquake-triggered landslide in the Chiufenershan area during the Mw 7.6 Chi-Chi earthquake in Taiwan

Chan, Y.C. (1), Wu, C.Y. (2), Chang, K.J. (1), Hu, J.C. (2)

(1) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, R.O.C.

(2) Department of Geosciences, National Taiwan University, Taiwan, R.O.C.

(yuchang@earth.sinica.edu.tw / Phone: +886-2-27839910 ext. 411)

Earthquake-triggered landslides are known to be controlled significantly by pre-existing structural and geomorphic characteristics of the landslide region. In order to better evaluate such controls on the well-known earthquake-triggered landslide in the Chiufenershan area during the Mw 7.6 Chi-Chi earthquake in Taiwan, we carefully generate high resolution pre- and post-landslide digital elevation models of the area to characterize the geologic controls for the slope failure. We produced 2 m digital elevation models using aerial photogrammetry by selecting pairs of aerial photographs as close to the landslide event in time as possible. Applying the newly derived pre- and post-landslide DEMs, we mapped the joint and fracture system and the characteristics of differential erosion that may weaken the dip slope body making it possible to slide. Based on our field and DEM investigation, we found that gully erosion along both sides of the sliding body plays an important role for weakening the overall support of the slope body. We also found that three joint sets, which seemly govern some of the boundary of the sliding body, dominate the pre-landslide topography. Furthermore, there is a zone of pre-existing fractures within the middle part of the slope body, which are approximately perpendicular to the sliding direction. The orientation of the fractures does not favor shearing off of the slope body, in contrast, it may provide the potential weak zone for the slope body to buckle leading to the eventual large-scale Chiufenershan landslide. In total, the deep gully erosion along the edges of the sliding body, the orientation of the pre-existing joint sets, and the pre-existing concentrated fracture zone may contribute to the occurrence of initial buckling failure and lastly

shearing off of the slope body during the earthquake-triggered landslide event.