Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06472, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06472
EGU General Assembly 2008
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Topographic amplification and landslide distribution

C.T. Lee, P.F. Wang

Institute of Applied Geology, National Central University, Taiwan (ct@gis.geo.ncu.edu.tw).

Topographic amplification phenomenon can be observed both by instrumentations and distribution of ground failures. There are more than three hundred strong-motion stations installed on the slope land in Taiwan. These are the best data for studying topographic amplification. The 1999 Chi-Chi earthquake of Mw 7.6 triggered more than ten thousand individual landslides on the slope land in Taiwan. Many of these slides are close to ridge top, unlike those trigged by a storm where slides are close to river side. We have found that relative-height-to-riverbed is a good factor to interpret the distribution of earthquake-induced landslides in previous study. This study discusses more factors which may be possibly related to topographic amplification. These include lithology, topographic gradient, aspect, roughness, curvature, and relative-position-in-a-valley. Vs30 is used to represent the lithology. The others are calculated from DEM. Among these, relative-position-in-a-valley is found to be an important factor also. Others are also important to some extent. But, there may be dependency between each two factors. There relative importance need to be further investigated. We used multiple regressions to find the drift or trend of Arias intensity, and then used Kriging with local means method to do interpolation between stations. At last, these Arias intensities were used to interpret the landslide distribution at some representative regions. We found it is feasible and also a must to consider topographic amplification in interpreting the landslide distribution.