



Assessment of Landslides Caused by Earthquake- Case Study of Chi-Chi Earthquake in Taiwan, 1999

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The Chi-Chi earthquake with a magnitude of 7.6 struck central Taiwan and caused server landslides in 1999. In 2000, NASA launched space shuttle to execute a global topography measuring mission, which produced SRTM DEM. The landslides caused by the Chi-Chi earthquake in central Taiwan were studied using SRTM DEM and DEM generated using aerial photographs taken before the earthquake. Due to the limitation of resolution of SRTM DEM, 50 landslide cases with area larger than 320,000 m² were adopted in this research. Theses landslides were identified using SPOT images and aerial photographs taken after the earthquake. The slope profile of each landslide was produced to examine the accuracy of SRTM DEM. Accordingly, about 1/3 of the 50 landslides were selected for further analysis.

Jibson(2000) used the Newmark's displacement as the parameter for assessment of landslides induced by earthquake, and a displacement of 10 cm was proposed as the threshold displacement of slope failure. However, in order to perform such analysis, it is necessary to determine location of the failure plane of landslide. Based on the study of slope profile of landslide using SRTM DEM and DEM, location of the failure plane can be determined. The resulting failure planes of most landslides are shallow plane failure, which are consistent with the characteristics of infinite slope failure. The applicability of infinite slope theory was defined based on the relations between cohesion, friction angle, and unit weight of the material, slope height and depth of failure plane. Observing the limitations of the infinite slope theory, the Newmark's displacements of the identified landslide cases were computed. More than 60% of the studied landslide cases could be predicted using this method when a slope was considered as reaching the failure state with a Newmark's displacement of 10cm.

Key words: landslide, earthquake, case study, Newmark's displacement, SRTM DEM, aerial photograph.