



The Rainfall and Rainfall Kinetic Energy Intensity-Duration of Landslides and Debris flow in Taiwan

Jui-Ming Chang (1) and Hongey Chen (1,2)

(1) Department of Geosciences, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei, Taiwan, (2) National Science and Technology Center for Disaster Reduction, Taipei, Taiwan

This research used Joss-Waldvogel Disdrometers (JWD) which set in Shiment catchment, Northern Taiwan and Chishan catchment, Southern Taiwan to record rainfall kinetic energy data, to find the relationship between rainfall kinetic energy and rainfall intensity in these two areas. The distance between the two areas is less than 150 km. These data help the researchers and showed that the equations of relationship were $ek_N = 28.7 * (1 - 0.7027 * \exp(-0.0395 * I))$ and $ek_S = 27.4 * (1 - 0.5954 * \exp(-0.0345 * I))$. Generally, rainfall kinetic energy in Northern Taiwan is higher than in Southern Taiwan during rainfall period. Also, the occurring time and rainfall records of 143 landslide events from 2006 to 2012 were analyzed. The rainfall-intensity (I-D) relationship could be used to build rainfall threshold which were $I_N = 15.13 D^{-0.28}$ and $I_S = 47.58 D^{-0.35}$. In brief, the rainfall feature in landslide of Northern Taiwan had low rainfall intensity, long rainfall duration and low average accumulative rainfall. By combining rainfall kinetic energy and rainfall threshold, rainfall kinetic energy threshold could be established, which were $\bar{E}_N = 13.83 D^{-0.04}$ and $\bar{E}_S = 15.59 D^{-0.02}$. The results showed that not only for rainfall but also for rainfall kinetic energy threshold, the values of thresholds in North were lower than those in South. Due to impaction energy of rainfall to ground surface, rainfall kinetic energy would not forever increase. Therefore, rainfall kinetic energy threshold is also a useful tool for landslide warning.

Key words: Rainfall kinetic energy, Rainfall threshold, Rainfall kinetic energy threshold, Landslide