

Slow landslide induced by Typhoon Morakot in central Taiwan via PIV analysis

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In 2009, Typhoon Morakot brought heavy rainfall and triggered at least 304 landslides in Yuchenliao, Meishan Township, central Taiwan. Typhoon Morakot produced copious amounts of rainfall, peaking at least 2,888 mm, far surpassing the previous record, 1,736 mm by Typhoon Herb in 1996. Throughout the disaster, various data indicates a great potential of multiple magnitude landslides in these areas. We analyzed three orthorectified aerial photographs of the Yuchenliao area, which were taken in January 2001, January 2007 and August 2009, using the Particle Image Velocimetry (PIV) technique. The sub-pixel correlation of PIV analysis in the Yuchenliao area covers a dimension of 2801×3001 pixels. Our results of the PIV analysis revealed that the maximum horizontal displacement of the landslide in the study area is up to 70 m towards south, and the dimension of the Yuchenliao landslide area is measured about 0.28 km². In spite of the shallow landslide, the results of PIV show bigger landslide area than the previous research estimated by the movement of characteristic geomorphological features from orthorectified aerial photographs before and after Typhoon Morakot. In addition, the PIV technique could provide the displacement field of slow landslide area which be used to inverse the slip distribution of sliding area to assessment the potential landslide hazard of this slow slide event.

Keywords: landslide, Morakot, Yuchenliao, Particle Image Velocimetry