



Automated extraction of event-induced landslides by an image change detection method

Chyi-Tyi Lee and Fang-Chun Kuo

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

Construction of an event landslide inventory is a trend in recent landslide research. High spatial and high temporal resolution remote sensing images are convenient for construction of an event-triggered landslide inventory. Automated detection of image changes between tone difference of a prior-event image and a post-event image is found feasible in our recent studies and it is time-saving and more thorough in the mapping area. Change vector analysis of two time-sequential images is commonly used to detect remote sensing change objects using change vector distance and spectral angle. The present study uses both change vector magnitude and orientation to detect landslides.

This study used SPOT5 multi-spectral images before Typhoon Aere and after Typhoon Aere at the Shimen Reservoir catchment. Two rectified satellite image was geometrically correlated and corrected to a sub-pixel level. And then, histogram matching made the irradiance of multiple images unifying. At last, change vector analysis was utilized for the detection of event-induced landslides. Through trial and error and help with training sample sets, change thresholds were determined as change vector distance greater than 30 digital number (DN) and a specific change vector orientation space to obtain hot spots of possible landslides induced by the Typhoon Aere. These hot spots are finally screened by using local slope gradients, original image spectral value, and the present of recent alluvium, to complete an event-triggered landslide inventory of Typhoon Aere. The classification error matrix shows that user's accuracy of landslide is 78.20%, producer's accuracy of landslide is 96.25%, overall accuracy is 99.88%, and Kappa index also reaches 0.99. The study result is very good.