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小波轉換應用於土石流地聲分析-以愛玉子溪事件為例

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摘　　要　本文針對南投縣信義鄉神木村的愛玉子溪觀測站，觀測到 2004 年 7 月 2 日敏督利颱風和 2006 年 6 月 9 日水災發生兩次土石流事件，利用小波轉換（wavelet transform）分析地聲檢知器資料後，不但可以分離出外在環境的干擾，也可以既快速又準確的判斷出土石流事件發生的時間。由於土石流地聲訊號的強度與土石流的規模有直接的關聯性，故利用小波轉換後的累積能量，訂出小波累積能量指標（wavelet energy indicator），再經由這兩次不同規模的土石流事件結果，暫訂出愛玉子溪土石流地聲觀測指標值。由於小波轉換的計算量小，可於土石流觀測站的前端電腦直接運算，並作爲災害來臨時，判斷土石流發生的時間與規模之依據，並可大幅提升防災應變的能力。

關鍵詞：土石流地聲、地聲探測器、小波轉換、小波累積能量指標。

Analysis of Debris Flow Underground Sound by Wavelet Transform - A Case Study of Events in Aiyuzih River

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ABSTRACT　The wavelet transform is employed in this study to analyze the underground sound of debris flows obtained from the geophones. Two debris flow events observed at Shenmu Village monitoring station （Nantou County） on July 2, 2004 （Mindulle typhoon） and June 9, 2006 are selected as examples. It is found that the wavelet transform not only can effectively separate ambient noise but also can be used to determine the beginning time of the debris flow event. To estimate the

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magnitude of debris flow event, a so-called wavelet energy indicator is proposed. Since the computational time of wavelet transform is small and can be implemented in the computer at monitoring station, it can be used to determine the occurrence of debris flow and estimate its magnitude.

Key Words: geophone, debris flow underground sound, wavelet transform, wavelet energy indicator.