

## 摘要

本計畫針對土石流觀測站最常使用的影像與地聲資料，發展可用於預警的快速加值運算，並以智慧型網站串聯，做到自動偵測與預警。

加值資料運算包含以攝影機與地聲檢知器產出流深，流速，流量與表面大粒徑速度。以加值資料配合事先以不同情境的模擬結果，建立早期預警與即時預警的方法。為了確保現場儀器資料的準確度，設計現場檢校儀器的方式，以確保監測儀器獲得的資料的準確度。

針對長期的集水區土砂運移，本計畫以航拍與無人飛機資料，建立土砂堆積與運移的長期分析，經過與雨量的比較，產生長期的災害潛勢預報指標

監測資料，加值分析，長期潛勢等結果都以整合式互動網站呈現，事件偵測後的措施建議與自動執行通告均已自動化。

**關鍵詞：**土砂運移估算、土石流預警、現場儀器檢校

## Abstract

This research utilizes the data from CCD camera and geophone , with fast analyzing method , generate information such as flow depth , flow velocity , flow rate and huge boulder displacement to facilitate debris flow event warning. Detection data analysis and warning are all automated in a website. CCD camera and geophone calibration process in the field is designed and used to insure the accuracy of monitored data.

Simulation of debris flow influenced area with different scenario can be combined with geophone detection data to provide fast warning. Long term and short term warning can be issued with monitoring data.

This research also use aero photos and UAV photos to produce annual deposition and erosion records. Comparing with rainfall record , long time disaster potential can be estimated.

All monitored data analysis , warning and hazard potential are all exhibited in an interactive website. This intelligent website can further provide suggestions after event detected and perform warning and notification process automatically.

**Keywords: Sediment transport estimation , Debris flows warning , Field monitoring device calibration**