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南投縣和社溪沿線土石流之工程地質特性探討

he Study of Engineering Geology Characteristic of Debris Flow along Hoshe River, Nantou.

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摘要

本研究工作是以民國 85 年 7 月 31 日賀伯颱風在新中橫公路沿線南投信義鄉隆華國小西側之一號溪，以及新興橋西側之三號溪所形成之土石流案例作爲探討之主題。

本研究方法是以地貌表徵調查、地質調查、地質材料試驗以及土石流穩定性分析等四種方式來進行。在地貌表徵調查工作上，包括了航照判釋及現場地貌調查兩種方式。以歷年航空照片(共 15 年)作判釋的基準，再經由野外現地調查、取樣、測量等方式，將研究區域之地形資料在土石流災害發生前後之變化狀況做一初步之探討。在地質調查工作上，包括了地質構造與不連續面之量測。針對研究區域溝谷兩側不連續面之位態分布狀況及地質構造之形態作一了解，以探討土石材料之來源。在地質材料試驗上，包括了溝谷堆積物與岩石邊坡之自然物性試驗與力學試驗，試驗結果可提供由研究之初步結果發現：本研究區中之土石流災害在破壞形態分類上是屬於邊坡滑動型及河谷堆積物崩塌型兩者之混合型。另外，分布於一號溪及三號溪發生部之向斜軸，在地形上形成一窪地狀，平時易於集中崩落之土石，豪雨時易於集中地表逕流，有利於土石流之發生。此外，此處之岩體較爲破碎，爲土石提供來源之一。

由溝谷內堆積物及谷壁兩側構成平面破壞及楔型破壞模式之岩石邊坡之穩定分析結果況顯示。在一般的情況下，其安全係數值大於 1，屬於穩定的狀況，在含水飽和的情況下，其安全係數值則低於 1，屬於不穩定的狀況。因此，在高的降雨強度下，將使得溝谷堆積物產生崩塌，與水混合而形成土石流，在流動的過程中除了侵蝕兩側的谷壁外，溝谷兩側谷壁本身亦因達到飽和狀態而產生崩塌，與流動中之土石流混合，而增加土石流之土石方量。

關鍵詞：土石流、窪地、向斜軸部、不連續面、邊坡穩定、航空照片

Abstract

This study of debris flow is focused on the engineering geology characteristics at gully No.1 and No.3 which along the west side of Hoshe river, Nantou during typhoon Herb attacked on the end of July, 1996.

The study methods of this thesis include geomorphological features, geological condition, geometrical characteristics and slope stability analysis. The geomorphological features were comprehended by using the judgement of aerial photographs and the information of in-situ reconnaissance. The topography difference was comparisioned by overlapping the contour map before and after geohazard. The geological survey includes the orientation measurements of outcrops and discontinuities. The investigated results demonstrated that the failure types are combined of landslide and the collapse of the riverbed deposit. The syncline structures pass through the gully No.1 and No.3, landform the hollow landform. The hollow landform is easy to converge the runoff and rock fragments during heavy rainy.

The stability analysis displayed the results of rock and deposited geometrical on both sides of gully. In general, the safety factor is greater than 1 and the condition of rock slope and deposited geometrical are in stable condition. When the safety factor is smaller than 1, the rock slope and deposited geometrical are in unstable condition. Therefore, heavy precipitation could trigger the occurrence of debris flow which mixed the deposited geomaterial from both side of gully.

Key words: Debris Flow, Hollow, Syncline Axis, Discontinuity, Slope Stability, Aerial Photographs