地形特徵圖於防災需求應用

Application of Geomorphological Map in Disaster Prevention

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摘　要

地形特徵圖（Geomorphological Map）是「一種利用圖示表示的地景分類系統，使用描繪圖徵的方式記錄地形(landforms)、地表(surface)與近地表地質材料分布狀態」(Otto and Smith, 2013)，跨越地形學與地圖學的研究領域。國家災害防救科技中心、水土保持局及臺灣師範大學地理系於 2017 年至 2020 年合作，繪製木柵、草屯以及成功三個地區之系列式基本地形特徵圖，並於 2021 年開始針對特定主題繪製主題式地形特徵圖，例如大規模崩塌潛勢區與土砂災害區示範區。本文即利用 2021 年屏東縣來義鄉來義東、西部落為示範區，透過標註崩壞地形地表特徵與河流地形特徵，將尚未發生災害但風險較高的區域，利用地圖方式視覺化呈現，利於防災行為擬定與溝通。繪製結果發現，來義部落除了鄰近編號 T001 大規模崩塌潛在威脅之外，來社溪洪水氾濫也有相對的衝擊。透過中央研究院人社中心之臺灣百年歷史地圖可驗證，雖然 2009 年莫拉克颱風與 2010 年凡那比颱風造成大量土砂掩埋了來義大峽谷，但在 1952 有歷史航空影像也發現同樣地區亦有氾濫的發生。因此，利用山區閃洪模擬技術協助判定歷史的氾濫原範圍的界定，輸入不同降雨重現期進行模擬，協助區分屏東縣來義鄉河流作用之下河階、氾濫平原、扇階等，利於地表特徵之地形分類與標註，地形特徵圖即可說明環境的潛在災害位置與衝擊範圍，協助社區防災推動者於溝通時之工具，提高風險意識溝通效率。

關鍵詞：地形特徵圖，地圖，山區閃洪模擬技術

Abstract

The geomorphological map is "a graphical representation of a landscape classification system that records the distribution of landforms, surface and near-surface geological materials" (Otto and Smith, 2013). The map across the fields of study of topography and cartography. From 2017 to 2020, the National Science and Technology Center for Disaster Reduction, the Bureau of Soil and Water Conservation, and the Department of Geography of Taiwan Normal University collaborated to map a series of basic geomorphological maps for the three areas of Muzha, Caotun and Chenggong. In 2021, thematic geomorphological map

will be drawn for specific topics, such as large-scale landslide areas and demonstration areas of sediment disaster areas. The maps focus on describing the topographical features of settlements and environments such as Laiyi East and West tribes in Laiyi Township, Pingtung County. It is advantageous to disaster prevention behavior formulation and communication with using visualization of map combing the features of landslide, river, and other landforms and high-risk areas. The results of mapping showed that not only the large-scale landslide (number T001) but the flooding induced by Laishe River were the disaster hazard for the settlements on Laiyi tribes. It can be verified through the 100-year-history map of Taiwan by the Research Center for Humanities and Social Science of the Academia Sinica. Typhoon Morakot in 2009 and Typhoon Fanapi in 2010 caused a lot of landslide and the settlement to bury the Laiyi Grand Canyon, just as the event in historical aerial images in 1952 happened. Moreover, using the Scenario Simulation of Flash Flood for a Mountainous area with different rainfall return periods to help determine the boundary of river stage, floodplain, and fan stage, etc. To conclude, the geomorphological map can help to point out what hazard, where they come from, and how scale they influence as well as in providing a disaster-resistant community with better understanding of how settlements facing the environment.

Keywords: Geomorphological Map，Settlement，Scenario Simulation of Flash Flood for a Mountainous area