利用地形計測指標和河階去調查嘉義台南地區地貌構造的演化

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摘要

景觀的演變與構造及河流息息相關。在構造的驅使下，河流將快速通過分水嶺的遷移或襲奪作用進行流域盆地的重新配置，並在河流型態上留下異常訊號，例如遷急點或河流階地。地形地貌指標已經發展為提取流域內異常訊號的有效工具，能夠協助我們解釋可能的景觀演化過程。嘉義台南地區位在構造變形前緣，此區有許多構在存在，根據大地測量觀測顯示這些構造依然活耀，因此，這是研究構造演化與地貌反饋的好機會。根據我們在嘉義-台南地區的觀察和前人的研究，能發現地貌上存有殘餘的大型沖積扇，但目前並沒有找到相對應的源頭，表明河流可能因構造活動而改變了原路徑。首先，我們使用河流地貌指標 χ 來比較流域間的侵蝕力，用以評估分水嶺的穩定性並預測分水嶺遷移的趨勢。因此，能夠對未來及過去流域的動態作推演。再來計算河流陡度指標，用來指示構造活動及定位潛在的風口，協助我們解釋控制演化的因素。我們針對位置相對的流域盆地做分析，結果顯示兩者間存在相對的 χ 值，顯示此區分水嶺傾向於向西遷移，此結果讓向西流動的河流其盆地將隨時間變短，所以現今大型沖積扇會在小型盆地的下游區。另外高河流陡度指標也指示了斷層活動和風口的線索，告訴我們河流路徑和分水嶺遷移的可能原因是由於構造活動。根據地形和河流陡度指標，我們提出了一個可能存在風口的地區和一個沖積扇的可能來源，但未來我們還需要在野外收集資料做驗證。

關鍵字： 地貌演育、河流地形參數 χ、河流陡度指標

Investigating the morphotectonic evolution of Chiayi-Tainan area based on geomorphometry and fluvial terraces

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Abstract

The evolution of landscape is fundamentally coupled with tectonics and erosion. Rivers respond rapidly under tectonics: basins will rearrange their configuration by divide migration and river capture, which will leave anomalies in the river morphology, such as knickpoints or river terraces. Geomorphic indices have been developed as powerful tools to extract anomalies within river basins and they help us explain the possible landscape evolution. In Chiayi-Tainan area, the deformation front consists of several geological structures, which are still active today based on GPS observations, the present topography results from interactions between compressional tectonics and erosion. So, it's a good opportunity to investigate the structural evolution and the landscape response. Owing to our observations and previous research in Chiayi-Tainan area, there are remains of large alluvial deposits without an appropriate source, suggesting that the rivers probably change path due to tectonic activity. We used the fluvial geomorphic index χ which allows us to compare the erosion power of the drainages, evaluate the divide stability and predict the tendency of the divide migration. Therefore, we can assess the dynamics of the river basins in the future and the past. Then we extract channels steepness index which can indicate the tectonic activity, locate the potential wind gap, and eventually help us interpret the factors causing evolution. We find contrasted χ values in two catchments which are opposite to each other, indicating that the divide tends to migrate westward, making westward flowing basins shorter with time, so that the big fan is now located downstream a small basin. And the high steepness value indicates the fault activity and the clue of wind gap, indicating that the possible reason why the river path and basin rearrange the divide due to tectonic event. Based on the topography and steepness index, we propose one potential wind gap and an appropriate source for the large fan. However, we still need to find further evidence in the field in the future.

Keywords: Landscape evolution, Fluvial geomorphic index χ, Steepness index