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集水區流水下切動力模型的量化分析

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摘　　要　由於板塊構造活動速率相當緩慢，人類歷史的記載是無法反應長時距的變化，而構造地形指標具有反應較長時距構造運動特徵的性質，所以本研究以流水下切動力模型爲基礎，利用凹曲度（θ:代表地貌特徵）和標準化陡度（k_{sn}:代表地盤抬昇程度）兩個構造地形指標來探索中台灣造山運動帶的構造地形特徵。本研究結果顯示，中央山脈東西兩側的θ指標整體平均值分別爲 0.950 和 0.713，反應在地形地貌上所呈現兩側的不對稱性，由 k_{sn} 值往下游呈現漸增的趨勢與岩性條件下的反應漸減趨勢是相反的，以及近 50~60 年的平均降雨量亦或是流量對於 k_{sn} 指標的反應是沒有明顯的關聯性。本研究認爲岩性和近 50~60 年的氣候特徵並不是控制河流演化的重要因子，大地構造運動才是主因。由中央山脈東西兩側地區的整體 log(k_{sn}) 平均值幾乎是趨於相同的數值，來說明中臺灣的造山運動帶是呈現一個均衡穩定的狀態。最後本研究得到四個分區的大地構造活動性趨勢爲西部麓山帶地區＞雪山山脈地區＞中央山脈東翼地區＞中央山脈西翼地區。

關鍵詞：流水下切動力模型、凹曲度(θ)指標、標準化陡度(k_{sn})指標。

A Quantitative Analysis for the Stream Incision Power Model of the River Watershed

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ABSTRACT　Since plate movement is very slow, recorded human history is too short to register landscape change over such a long time scale. However, a longitudinal river profile can display watershed landscape characteristics. The purpose of this study is to explore the implications of the evolution of tectonic geomorphology for the orogeny of Central Taiwan using a concavity (θ) index and normalized steepness (k_{sn}) index based on the stream power model. The result of this study indicates the averages of the concavity (θ) index are 0.950 and 0.731, which respond to the asymmetric form on the east and west sides of Central Range. The normalized steepness (k_{sn}) index is expected to be decreased by the resistance of the rock stratum, but the result of this study displays an opposite trend. Moreover, the average precipitation in the past 50~60 years and the flow versus the normalized steepness (k_{sn}) index show no remarkable relationship. This study suggested the controlling factor of stream evolution over the past 50~60 years is tectonic movement, not the resistance of the rock stratum and climate. In addition, the averages of

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normalized steepness (k_{sn}) index for the two sides of Central Range are similar, implying a steady orogeny state for Central Taiwan. Finally, the Western Foothills Belt possessed the strongest tectonic movement, followed by Hsuehshan Range Belt, Eastern Backbone Range Belt and Western Backbone Range Belt.

Key Words: stream incision power model, concavity (θ) index, normalized steepness (k_{sn}) index.