餘震衰減行為與斷層特性之關聯性分析

Spatio-temporal characteristic of aftershock sequences
and its association with fault zone property

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摘要

根據餘震衰減定律(Omori`s Law)，離主震時間和距離越遠，餘震個數會衰減，全球餘震統計結果顯示餘震衰減時間與斷層速率高度相關，斷層長期滑動速率越大餘震衰減時間越短，如此之外 Toda and Stein (2002) 在加州 San Andreas fault 上的 Parkfield 到 Cholame 段，亦發現餘震衰減與斷層特性有關，潛移段(creeping section)和鎖定段(locked section)分別具有 0.6 年及 5 年的餘震衰減時間，在台灣潛移斷層-池上斷層亦然，具有 0.2 年的衰減時間，並伴隨大區域的餘震空間分布。然而，什麼控制了台灣餘震分佈之時間與空間特性，目前仍未有明確答案。主震大小、斷層幾何和斷層特性(滑移速率、潛移特性等)如何掌控餘震的時間衰減和空間分布，需要統整大量的主餘震序列數據以做系統性分析。本暑期計畫旨在收集全台灣主餘震序列資料，以充分理解餘震行為之控制因子。

Abstract

Aftershock sequences offer a rich source of information about fault properties and segmentation. The duration of the aftershock sequences depends on the nature of the faults, the focal depth, and the stress distribution on the fault. Toda and Stein [2002] examined the aftershock durations in Parkfield, California and found that the aftershock duration in the locked section is eight-fold longer than that in the creeping section. Zo¨ller et al. [2005] used a simulation model to show that the high ratio of creep coefficient leads to a fast aftershock decay rate. What controls the spatial expansion and temporal decay of aftershocks in Taiwan however, remain unanswered. This summer program aims at examining the M>5 mainshock aftershock sequences in Taiwan, to better understand the spatiotemporal characteristics of aftershock sequences and their association with fault loading rate, focal mechanism, focal depth, and fault zone properties.