2021 NTNU Summer student internship

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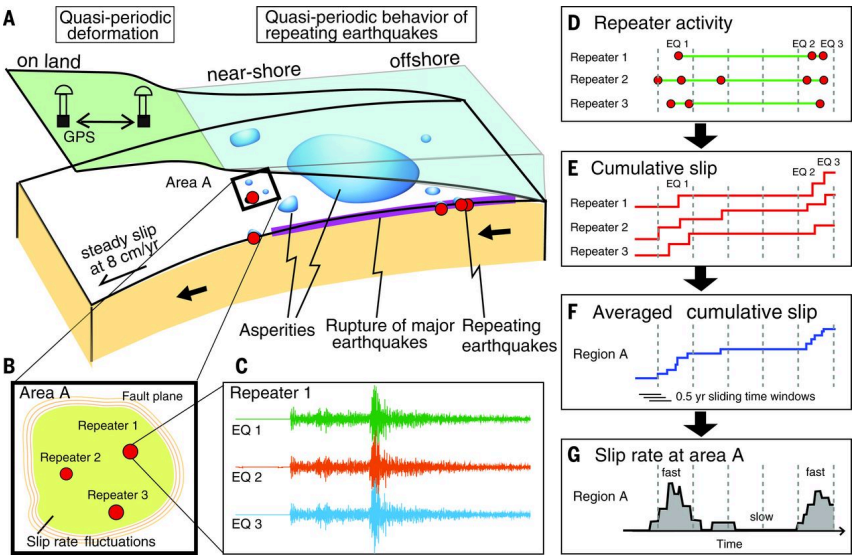
計畫主題：

潛移斷層的深部滑移速率監測: 2012 至 2020

計畫摘要：

在某些斷層系統上，一群地震可以重複地發生在同一個斷層嵌塊上，這群地震具有相同波形、 發震位置、大小、機制，稱做重複地震序列(repeating earthquake sequence)。由於地震的重複週期與負載之斷層滑移速率成反比關係，重複地震被視作是重要的斷層帶監測手段之一：利用其規模、復發週期可以推估此斷層嵌塊的滑移速率，而其優勢在於-不需經由逆推手段。立基於本研究是過去累積的重複地震目錄，本暑期計劃期能更新目錄至 2020 年，你會學到(1) 重複地震到底是怎麼決定的？ (2) 利用重複地震的週期特性如何推估深部滑移速率 (3) 以上方法論的限制和優勢各為何？本暑期計畫欲讓學生學習如何建立高相似地震資料庫，進一步檢驗、修正『利用重複地震推估滑移速率』此方法論的應用面。



(Naoki Uchida et al. Science 2016;351:488-492)

圖：斷層上同一個位置(A 圖紅圈)的重複破裂，稱作重複地震序列(例如圖 B 的 repeater 1)，一個序列中有三個地震事件，在不同的時間發生，他們具有一樣的波形(如 C 圖)。利用每個序列在時間中的累積滑移量分佈(D、E 圖)之加總，你能得到整個區域的累積滑移量之整體趨勢(F 圖)，若把他們除與小段的時間窗口後，則能得到該區域的短期平均滑移速率(G 圖)。

Project title:

Monitoring of deep slip rate in a creeping fault: From 2012 to 2020

Abstract:

Repeating earthquakes sequence as group of earthquakes with nearly identical seismic signature such as waveform, location, focal mechanism, is a powerful tool for understanding fault zone mechanics, earthquake recurrence, and seismic hazards. Their recurrence interval, serves as a sensitive sensor that responds to the change in loading rate in the immediate surrounding of the sequence. Built on the existed repeating earthquakes from 2000 to 2012, this project aims at investigating how much the deep slip rate changed after the year of 2012 on the Chihshang fault. The main objective of this summer project is to learn the methodologies and criteria for defining repeating event sequences in the Chihshang area, and further, to obtain the deep fault slip rate in real time.

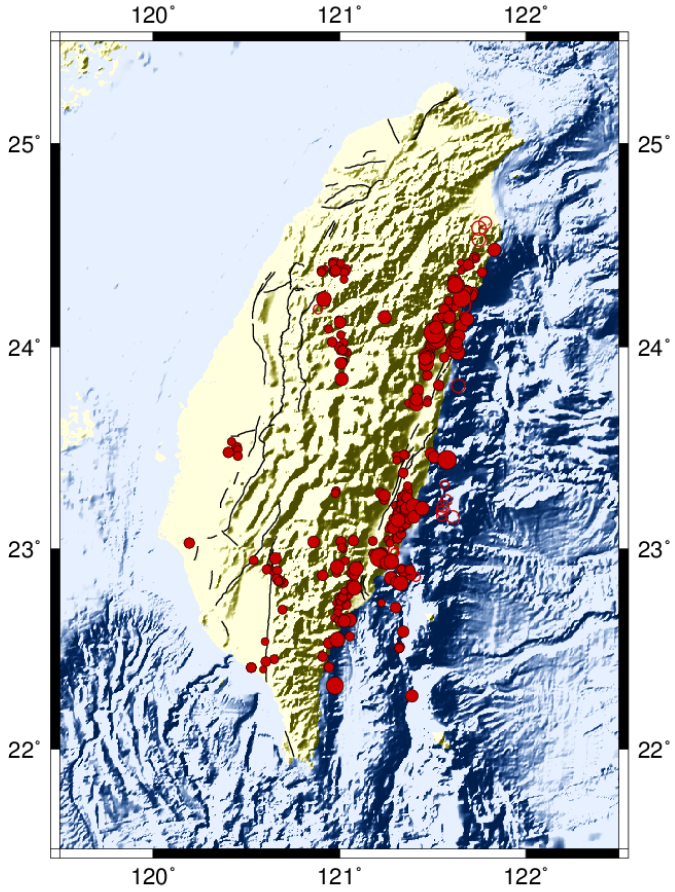


Figure: Location of magnitude greater than 2 repeating earthquakes in Taiwan during the study period from 2000 to the end of 2011.