

# 2011 NTNU Summer student internship

## Seismological research projects

**Goal:** Provide training in seismic data processing (in linux), introduce you to some of the most exciting aspects of modern seismology, and help you at each stage of the research project

**Possible projects:**

Can we obtain the deep fault slip rate using similar earthquakes?

**Details:**

Repeating earthquakes (group of earthquakes with nearly identical seismic signature such as waveform, location, focal mechanism) are a powerful tool for understanding fault zone mechanics, earthquake recurrence, and seismic hazards. However, the criteria for defining repeating event differ from one region to another. There is a general argument that inaccurate identification of repeating earthquake sequences can lead to wrong interpretations. How the reliability and interpretability of repeating earthquake data varies with event magnitude and regional data quality are also vitally important but are rarely discussed in the literature. The main objective of this summer project is to determine methodologies and criteria for defining repeating event sequences that are consistent between regions, meaningful in terms of reliable determination of fault slip rate at depth.

The internship is designed for a student who has a background in geophysics and is interested in learning data processing. Research projects may involve the analyses of seismic data in a lab setting with the ultimate goal of producing results to be presented at a national scientific meeting.

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### 你會學到：

- 地震資料處理基本訓練
- 如何組織、執行科學計畫
- 如何進行英文口頭發表

### 題目：

如何利用波形相似的地震群有效推估斷層滑移速率？

### 內容：

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。其優勢在於-不需經由逆推手段。

然而，重複地震的定義一般利用地震波形的相關係數，門檻值往往取決於地震訊號信噪比、測站分佈幾何的約制力、濾波範圍、和資料長度等等，不同規模的地震甚至應該有不同的相關係數門檻值。因為這樣因區域而異的標準，使得重複地震定義較為主觀，衍生的應用問題即是：如果只是空間上非常鄰近的地震(其波形相似度亦高，在此稱做相似地震)，他們能傳遞多少『滑移速率』的訊息？而什麼樣的資料條件才能使得相似地震有其應用價值？

本暑期計畫欲讓學生學習如何建立相似地震資料庫，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。

註：方法論詳見以下文章。<http://research.ncku.edu.tw/re/articles/c/20080926/5.html>