

# Waveform cross-correlation-based earthquake detection applied to microseismicity near the central Alpine Fault, New Zealand

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## Introduction

The Alpine Fault (AF) is a major plate boundary strike-slip fault known to fail in large (M 7-8) earthquakes every  $291 \pm 23$  yr (e.g., [Howarth et al., 2018](#)). AF poses the largest earthquake hazard source in the Southern New Zealand. This highlights the importance for a detailed seismicity catalog near the AF.

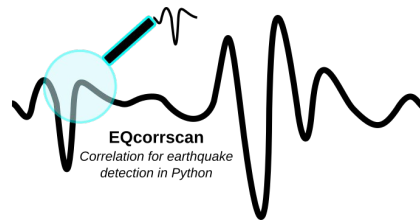
## Data and methods

Use matched-filter detection technique ([EQcorrscan](#); [Chamberlain et al., 2017](#)) to further extend existing earthquake catalog of 7,719 earthquakes recorded between late 2008 and early 2017 in the central AF ([Michailos et al., 2019](#))

## Template events

We have created **6,766** template events in total

- 1 s long time windows around P- and S-wave phases (start 0.1 s before picks)
- Signal to noise ratio (SNR) > 3.0
- Filtered between 2 and 20 Hz
- Downsampled to 50 Hz



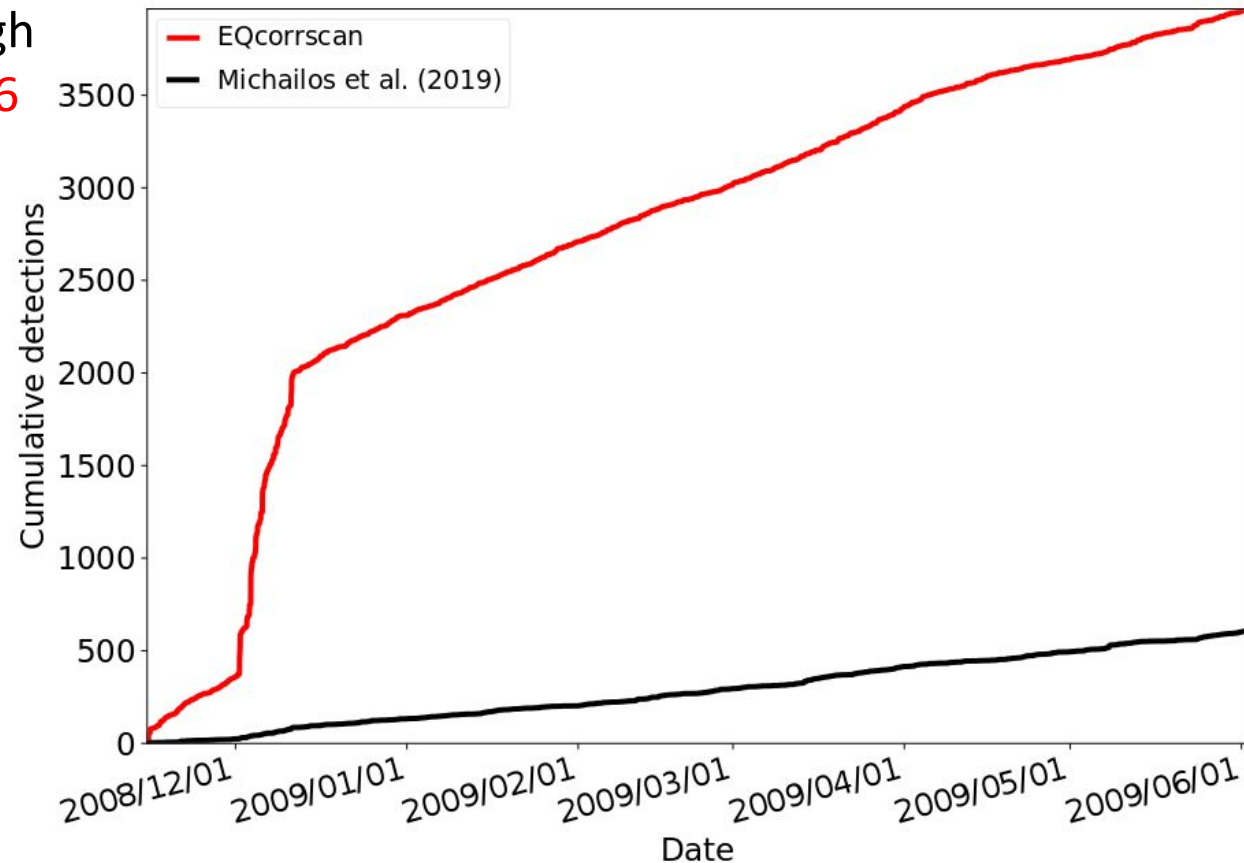
## Preliminary results

100 templates scanned through six months of data gave **~3,966 detections** (same period 606 earthquake locations)

## Next steps

Run [EQcorrscan](#) with **6,766** templates for a decade of continuous data (2009-2017) on [NeSI](#) high performance computing facilities (HPC)

Examine (1) temporal characteristics of local seismicity, (2) existence of repeating seismicity



*Cumulative number of earthquake located within the earthquake catalog of Michailos et al. (2019) with black vs the earthquake detections made using EQcorrscan with red.*