MONIFAULT Project

David's and Hugo's research work

H. S. Sánchez-Reyes, D. Essing, E. Beaucé and P. Poli

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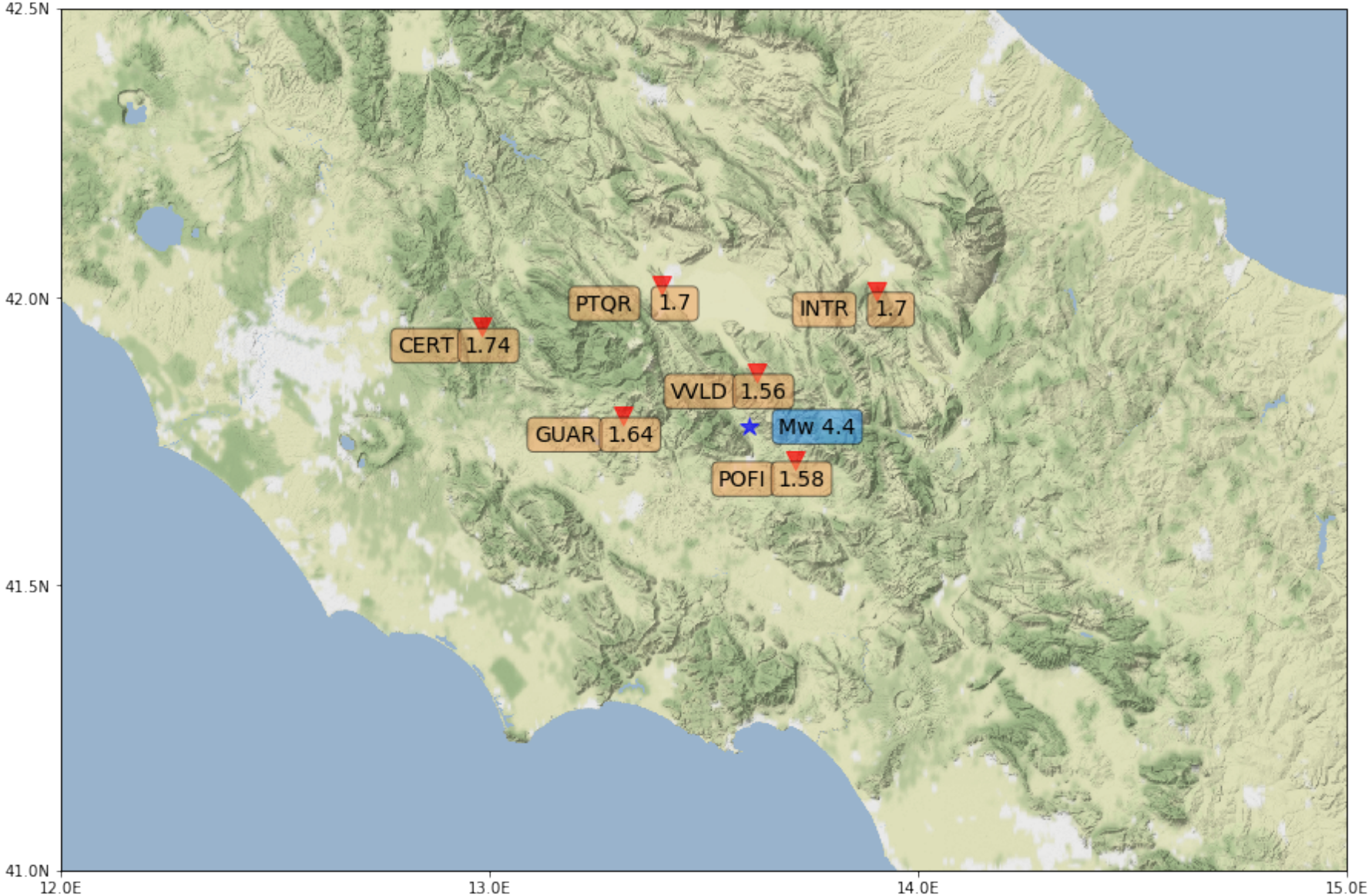
ISTerre, Université Grenoble Alpes

Outline

Analisis of foreshock and aftershock sequences using the FMF

Using the available continuous recordings from these stations



Analisis of the available templates

Characteristics of the event which spatio-temporal seismic activity evolution we are studying

- Mainshock M_w 4.4 normal faulting
- 16 km depth (middle lower crust)
- Central Italy

What we have precisely

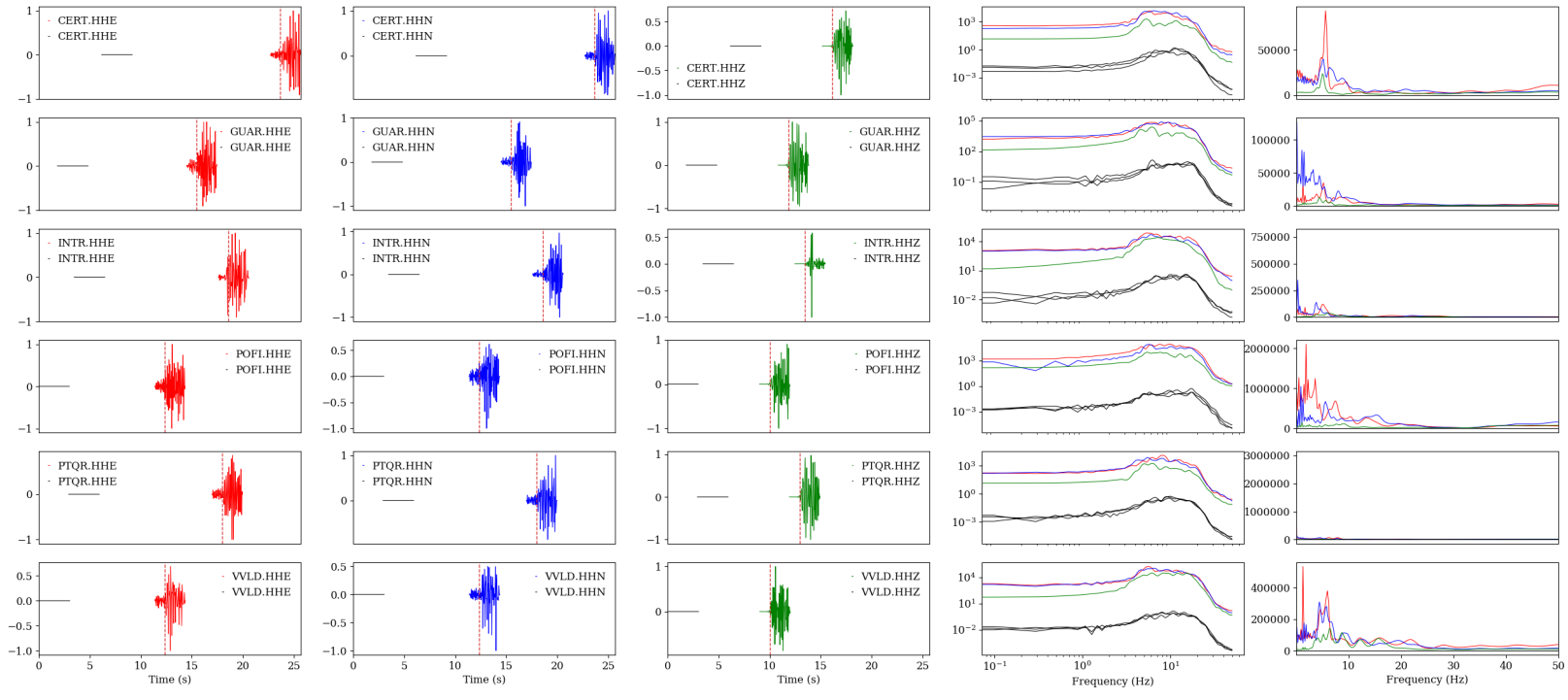
- 26 events reported by INGV
- P and S arrivals are available
- 6 stations have continuous data from 22 October to 15 November

Other events are reported, no P and S arrivals are always available for those other events. We should define a way to use them.

Analisis of the available templates

Good example of an event with acceptable Signal to Noise Ration (SNR)

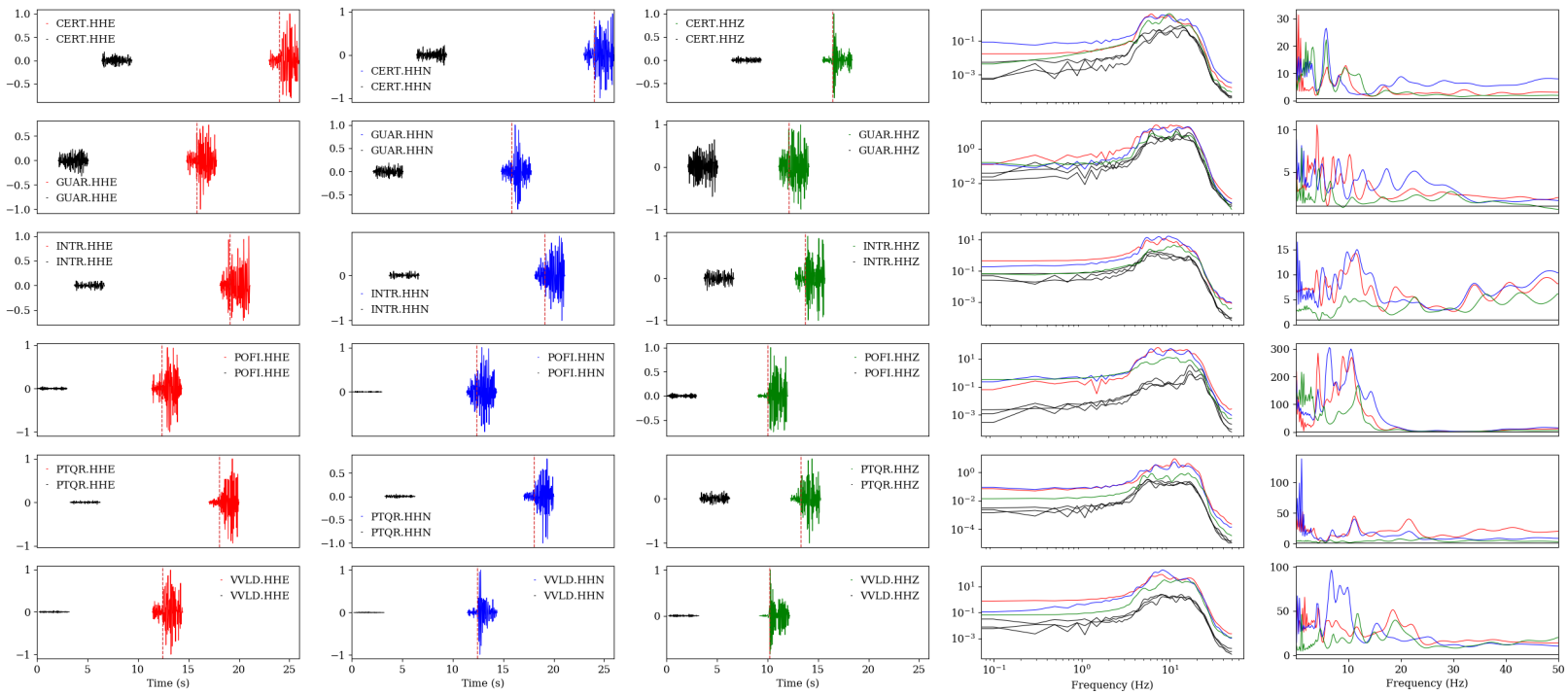
Mainshock M_w 4.4 $5 < \text{Freq} < 25$ Hz



Analisis of the available templates

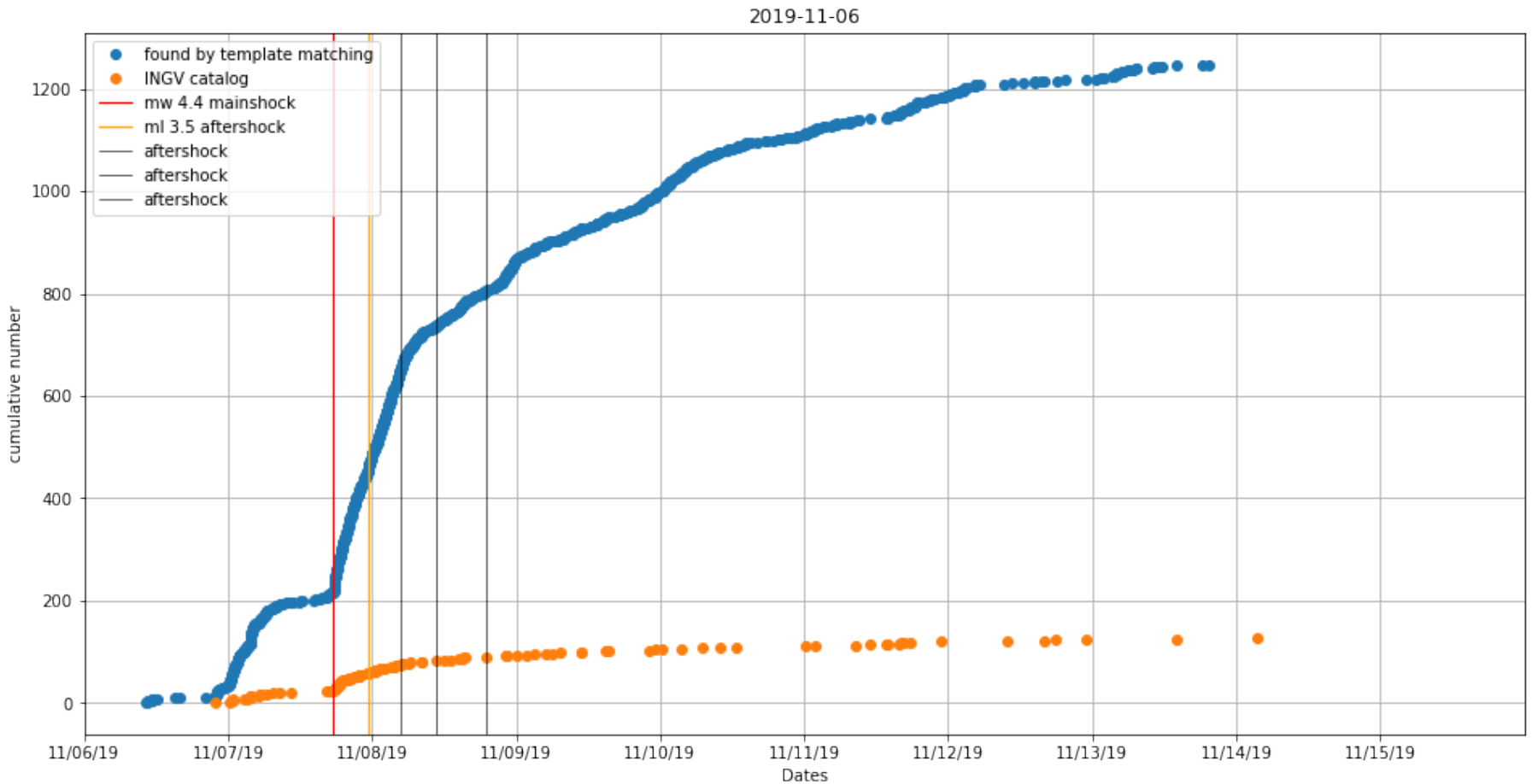
Bad example of an event with acceptable Signal to Noise Ration (SNR)

Aftershock 2 days later M_l 1.1 $5 < \text{Freq} < 25$ Hz



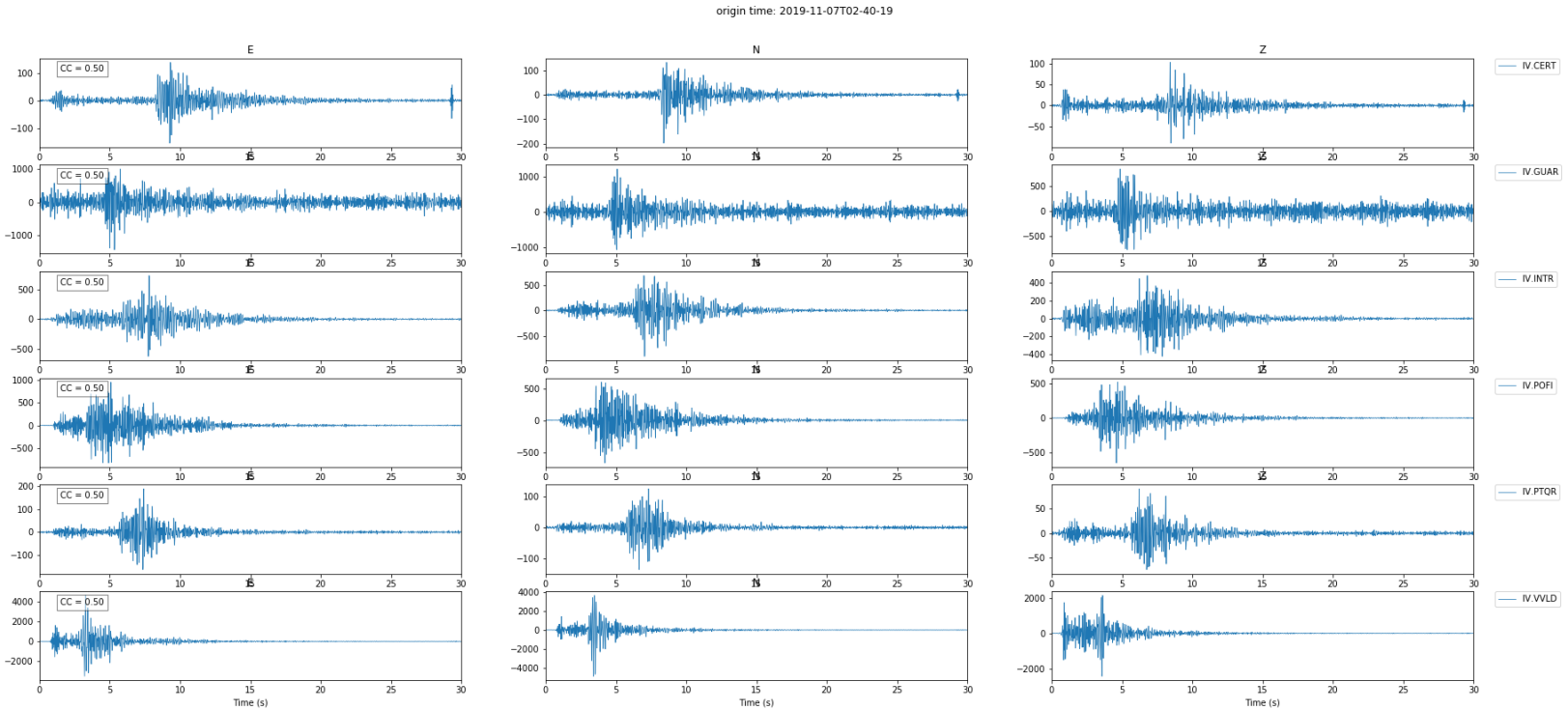
The new detected events

Comparison between INGV-detected events and our preliminary results



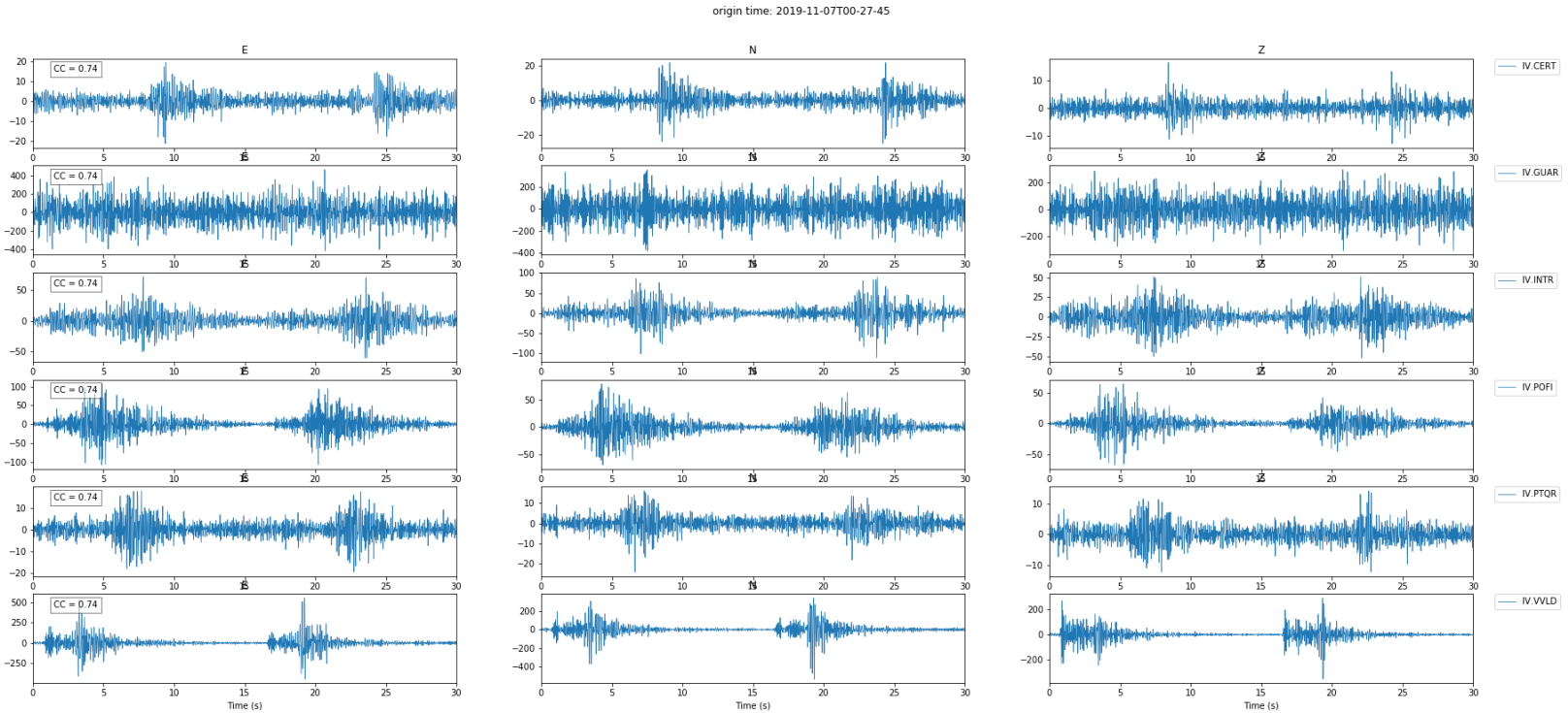
Example of detected events

Good example also reported by INGV



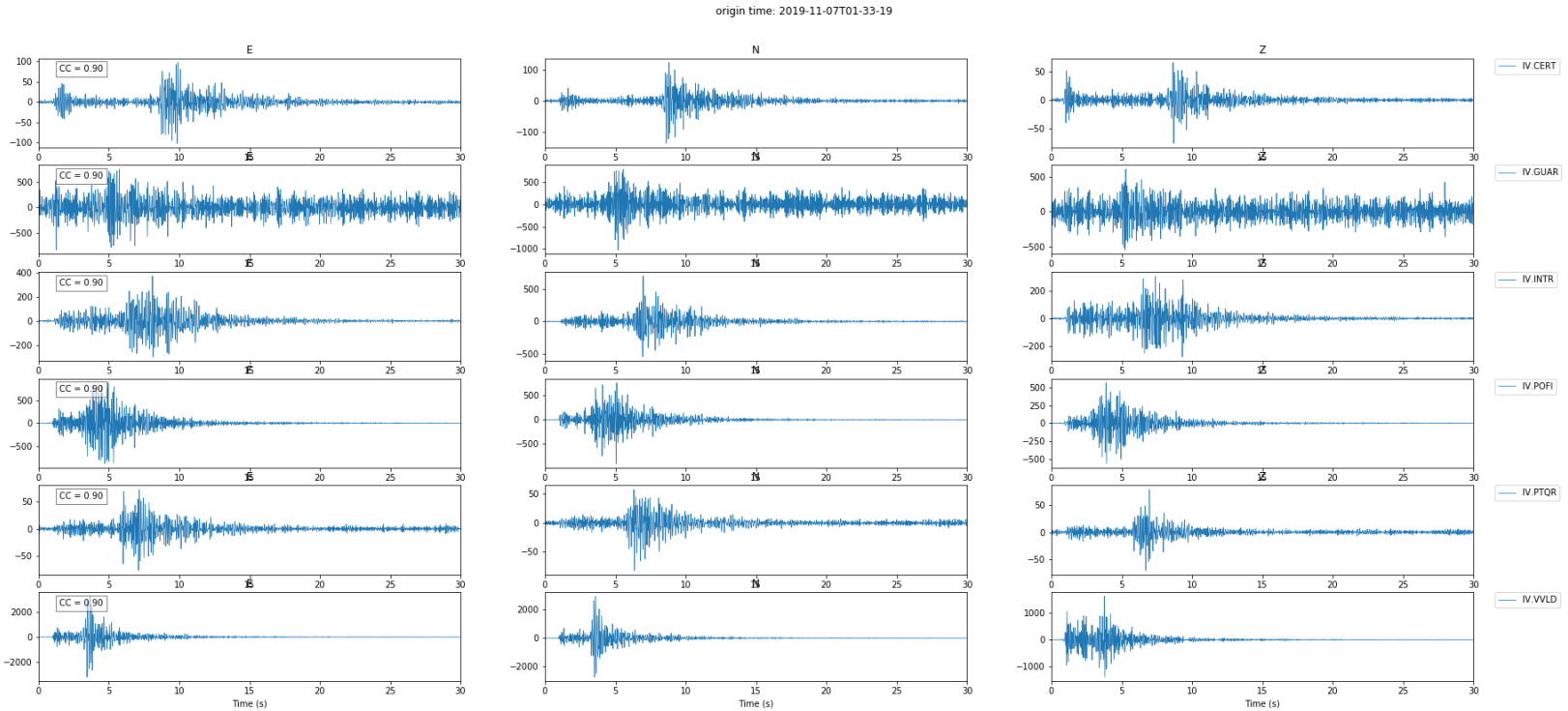
Example of detected events

Good example of 2 detected events not reported by INGV



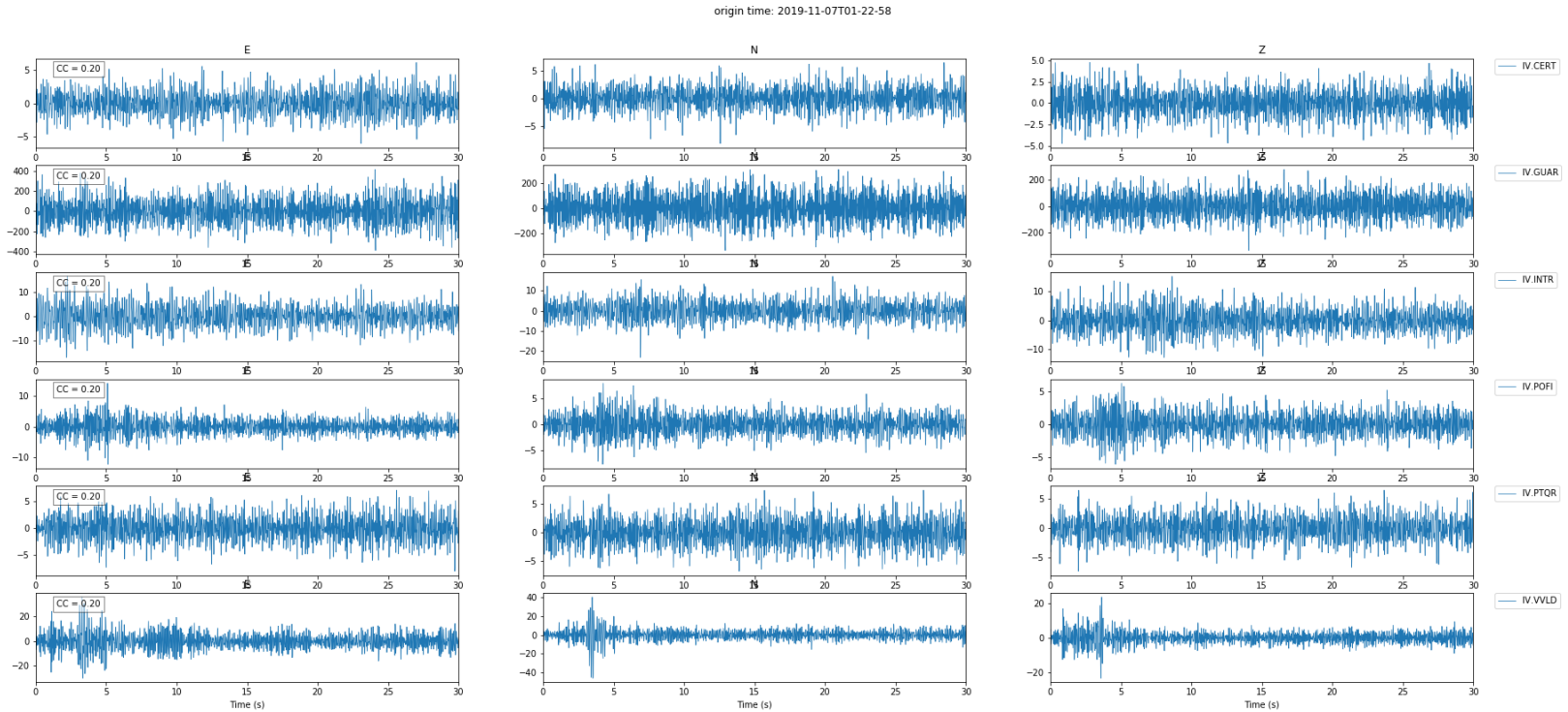
Example of detected events

Good example of detected events not reported by INGV



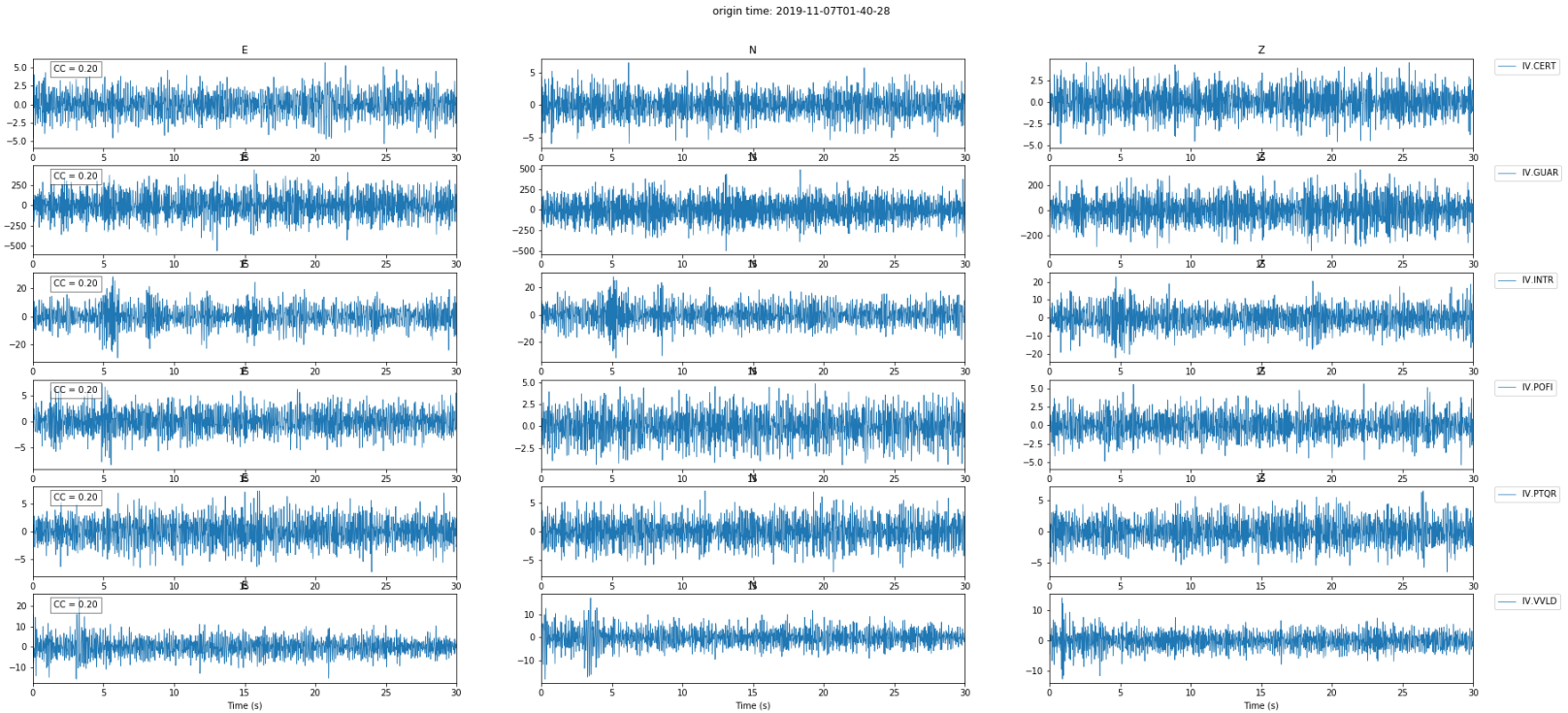
Example of detected events

Medium quality example of detected events



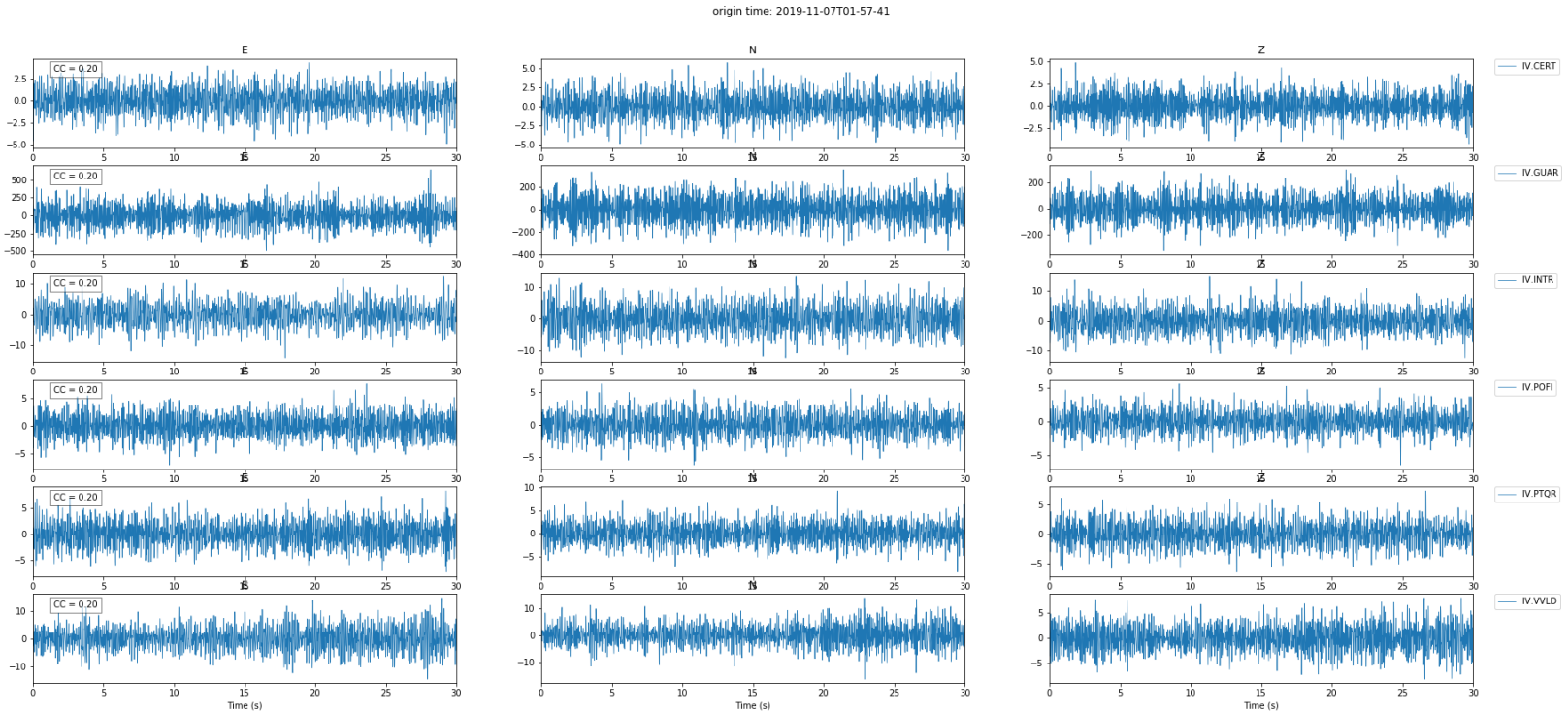
Example of detected events

Bad example of detected events



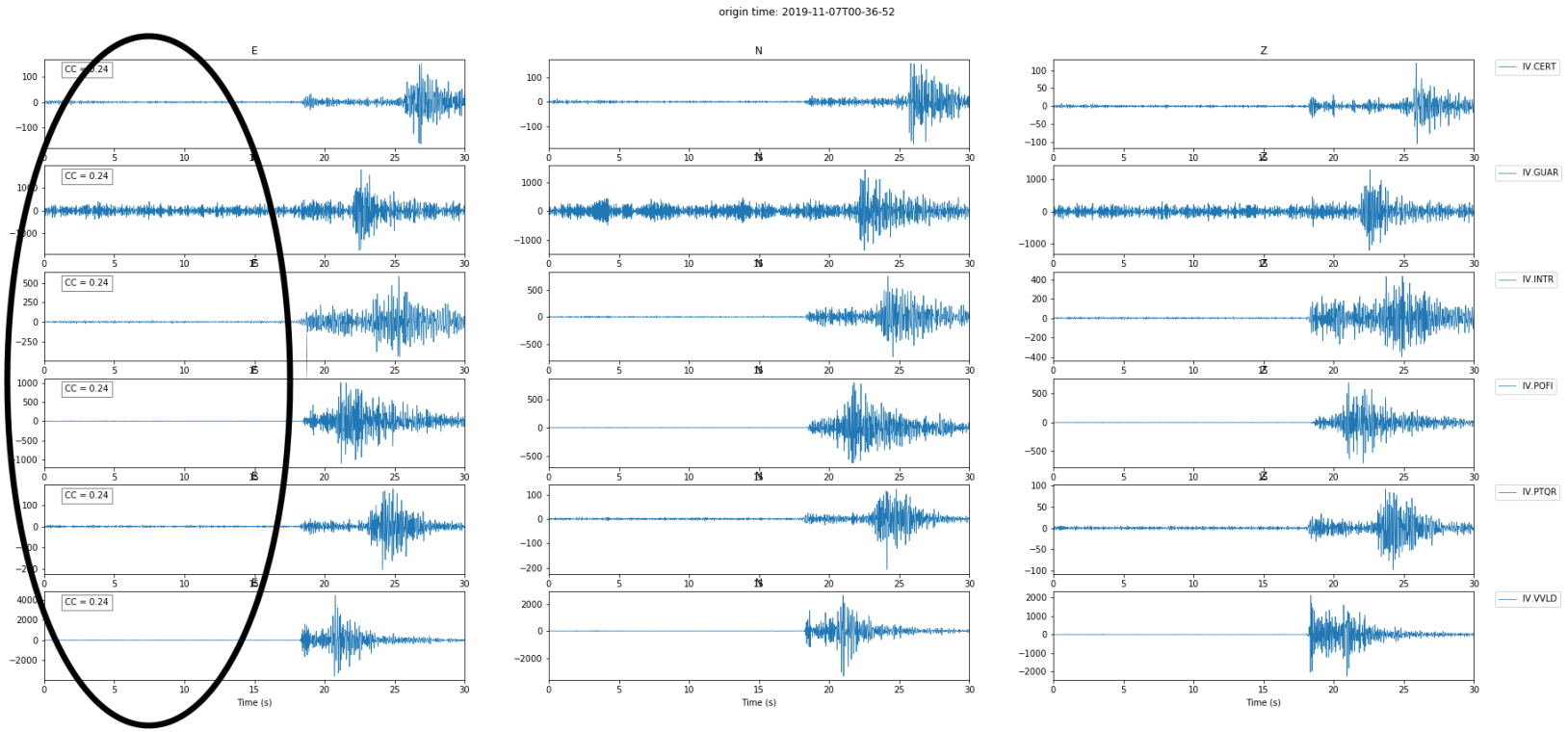
Example of detected events

Bad example of detected events



Example of detected events

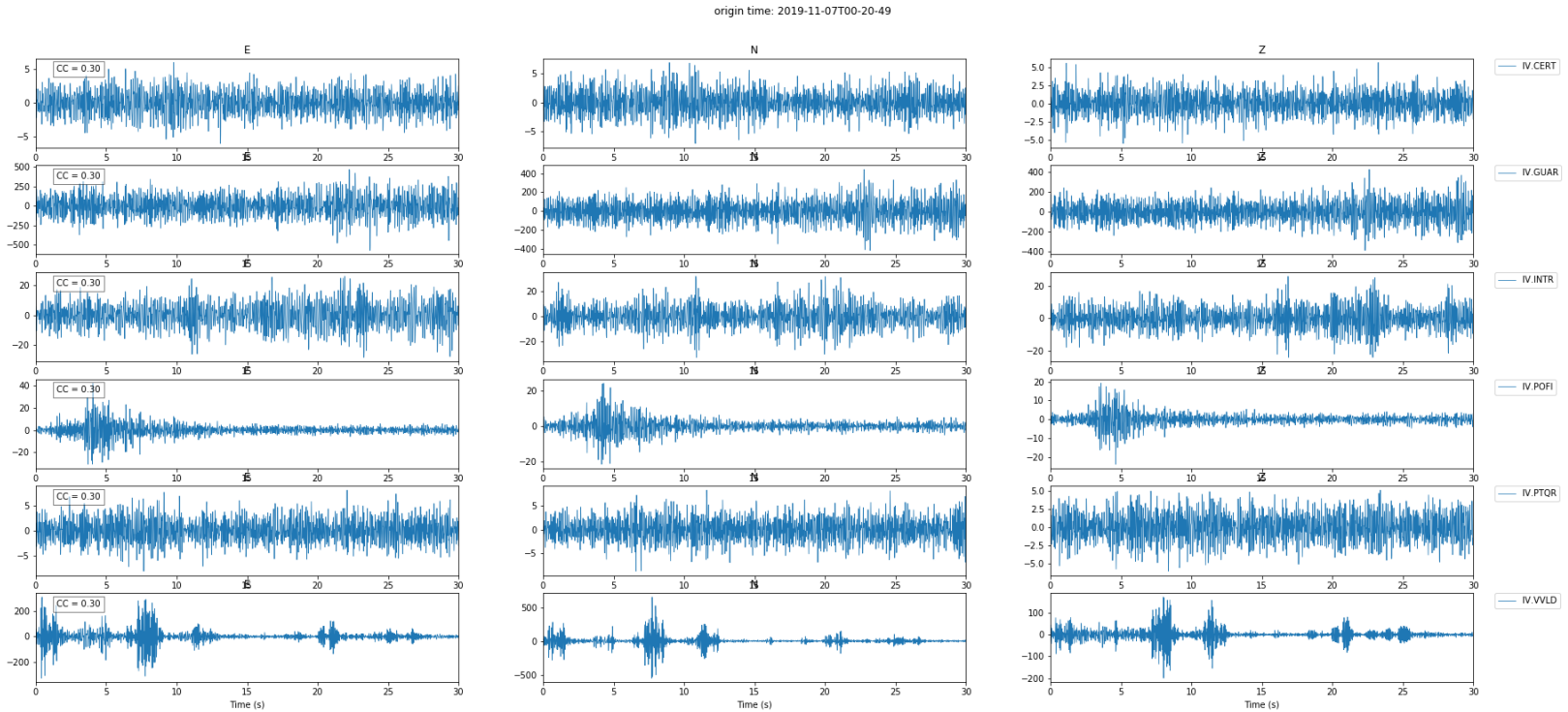
Weird example of detected events



Maybe the plot scale prevents to see the detected event!

Example of detected events

Weird example of detected events



old slides

Using a detected foreshock to analyze the seismic sequence

Earthquake with magnitude of **ML 2.5** on date 07-11-2019 and time 04:39:03 (Italy) in region **5 km SE Balsorano (AQ)**

Event data | Seismicity and Hazard | Impact | Locations and Magnitudes | Focal mechanism | Download

A magnitude **ML 2.5** earthquake occured in region: **5 km SE Balsorano (AQ)**, on

- 07-11-2019 03:39:03 (UTC) 20 days ago
- **07-11-2019 04:39:03 (UTC +01:00) Italian time**

and geographic coordinates (lat, lon) **41.78, 13.61** at **14 km** depth.

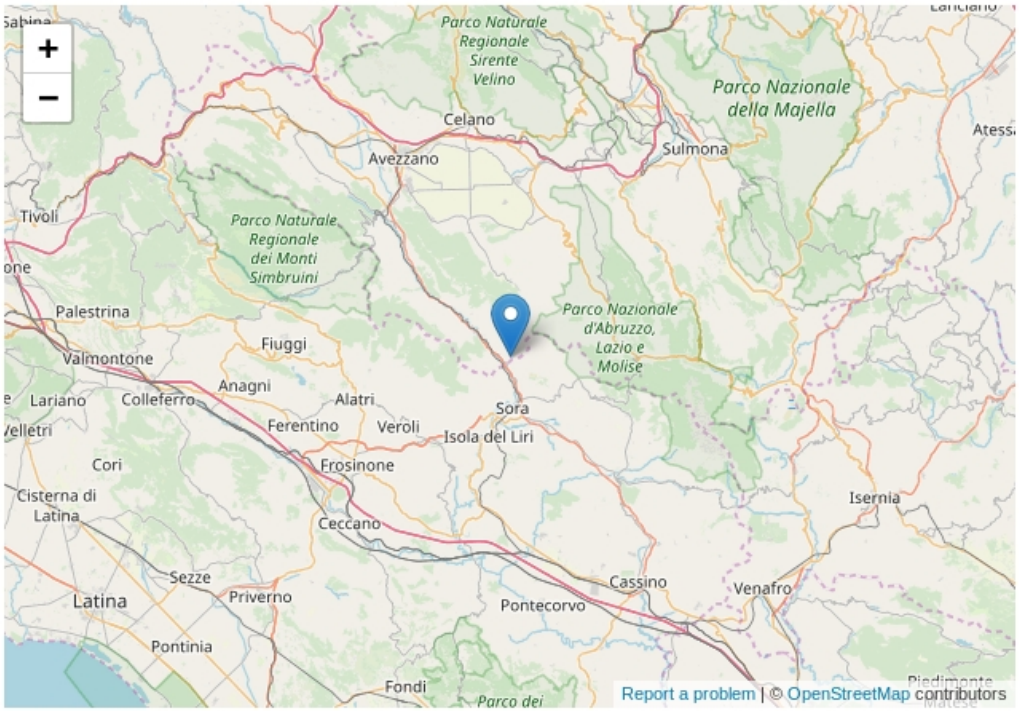
The earthquake was located by: **Sala Sismica INGV-Roma**.

Search earthquakes: Any within 30 km radius

The values of hypocentral coordinates and magnitude may be revised at a later time as more information becomes available.

haisentitoilterremoto ?

Did you feel it? Fill in the questionnaire.

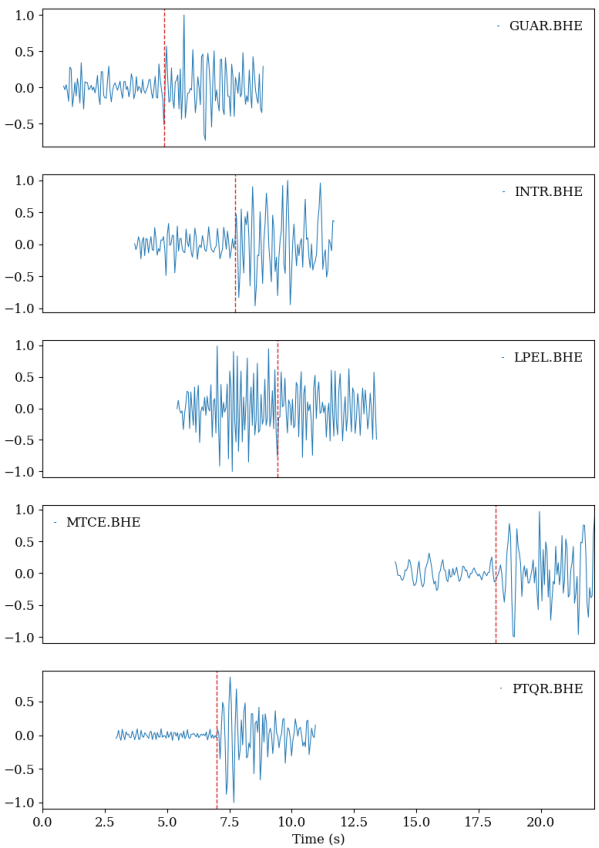


Display location by

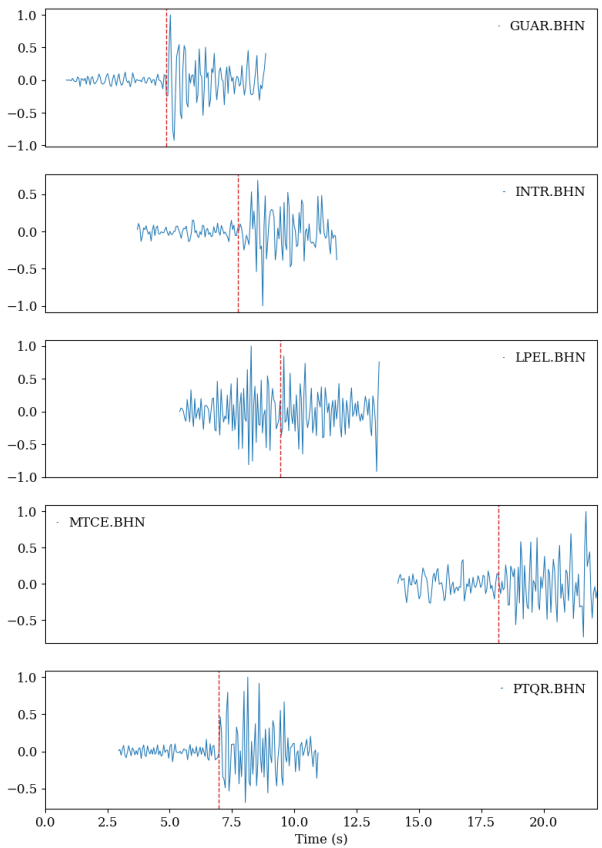
GeoHack | GoogleMap | OpenStreetMap

1^{rst} Step – Building template

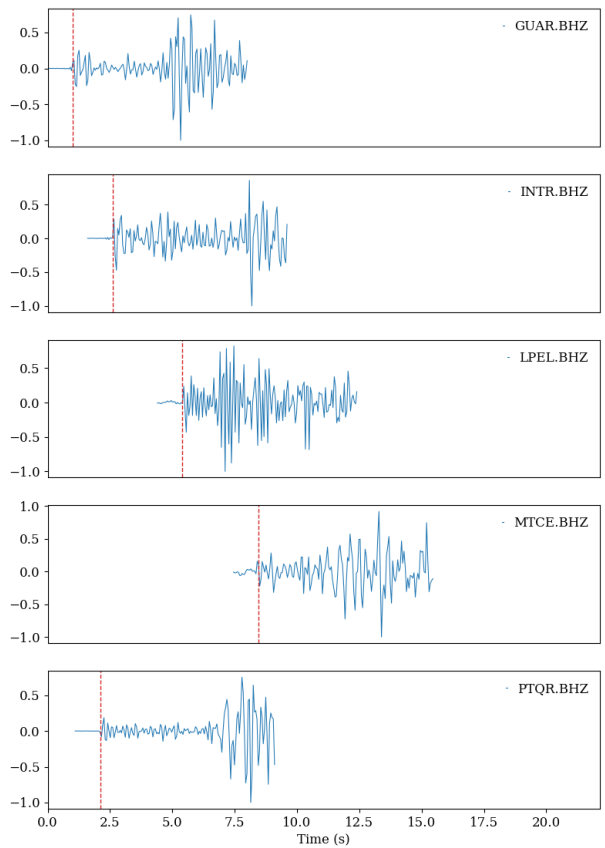
E-W



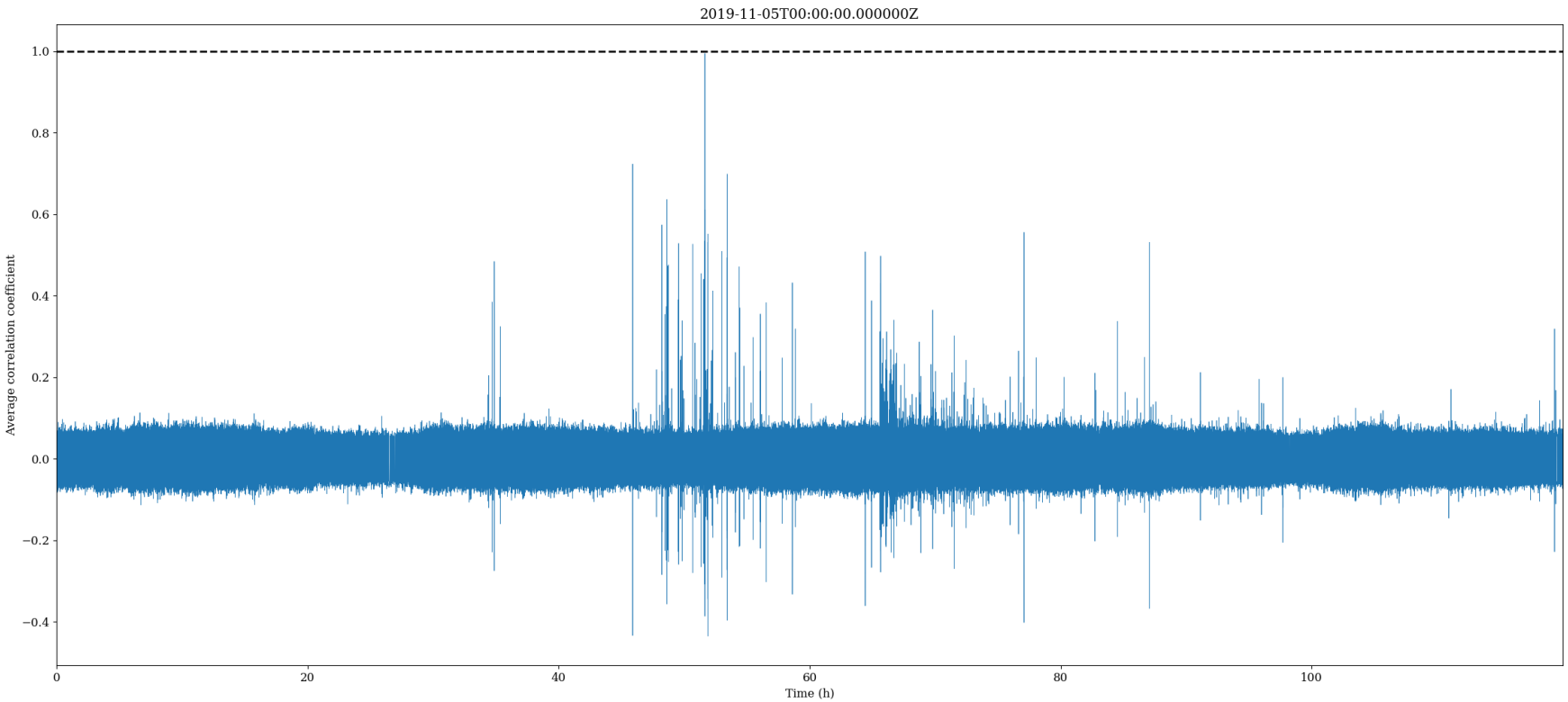
N-S



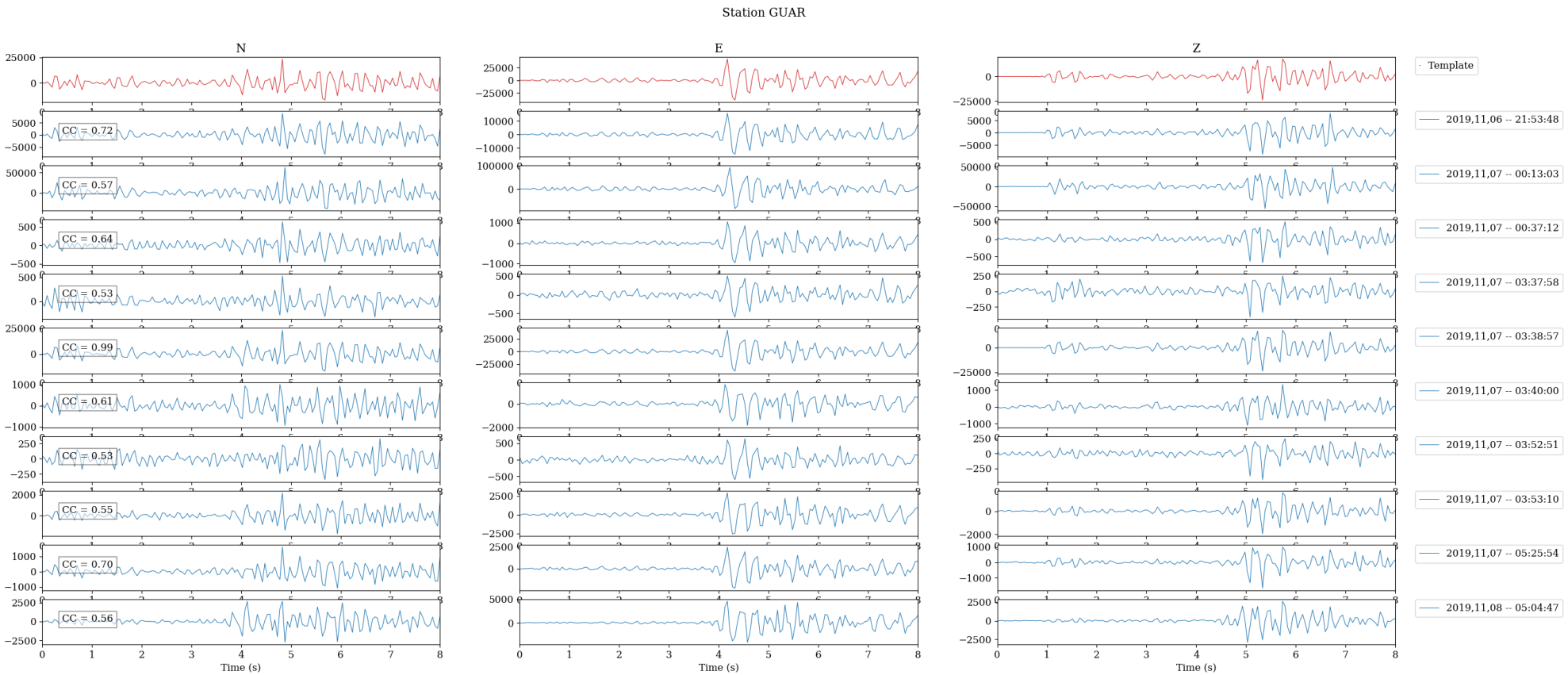
U-D



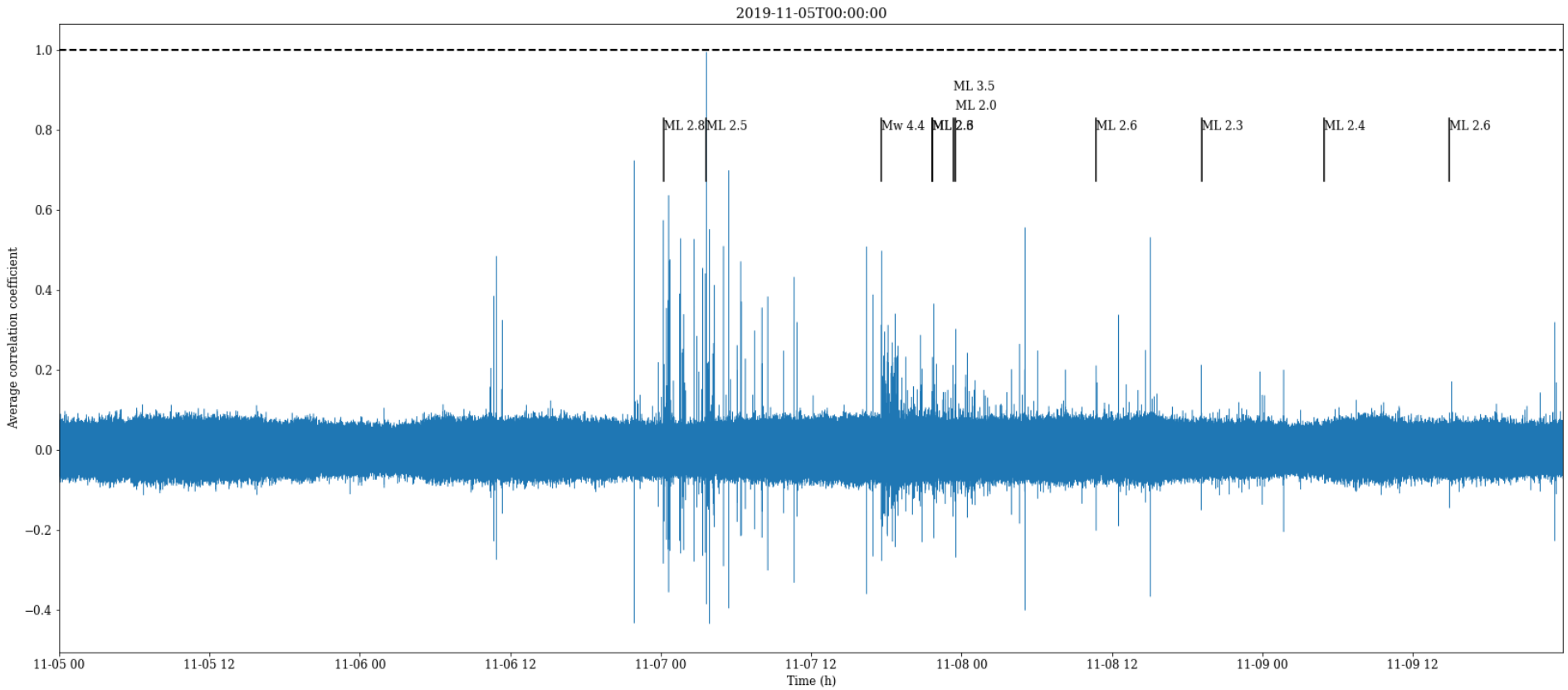
2^{nd} Step – Analisis of cross correlation coefficients using FMF (Beaucé et al., 2017)



3^{th} Step – Extraction of detected events based on CC coefficients

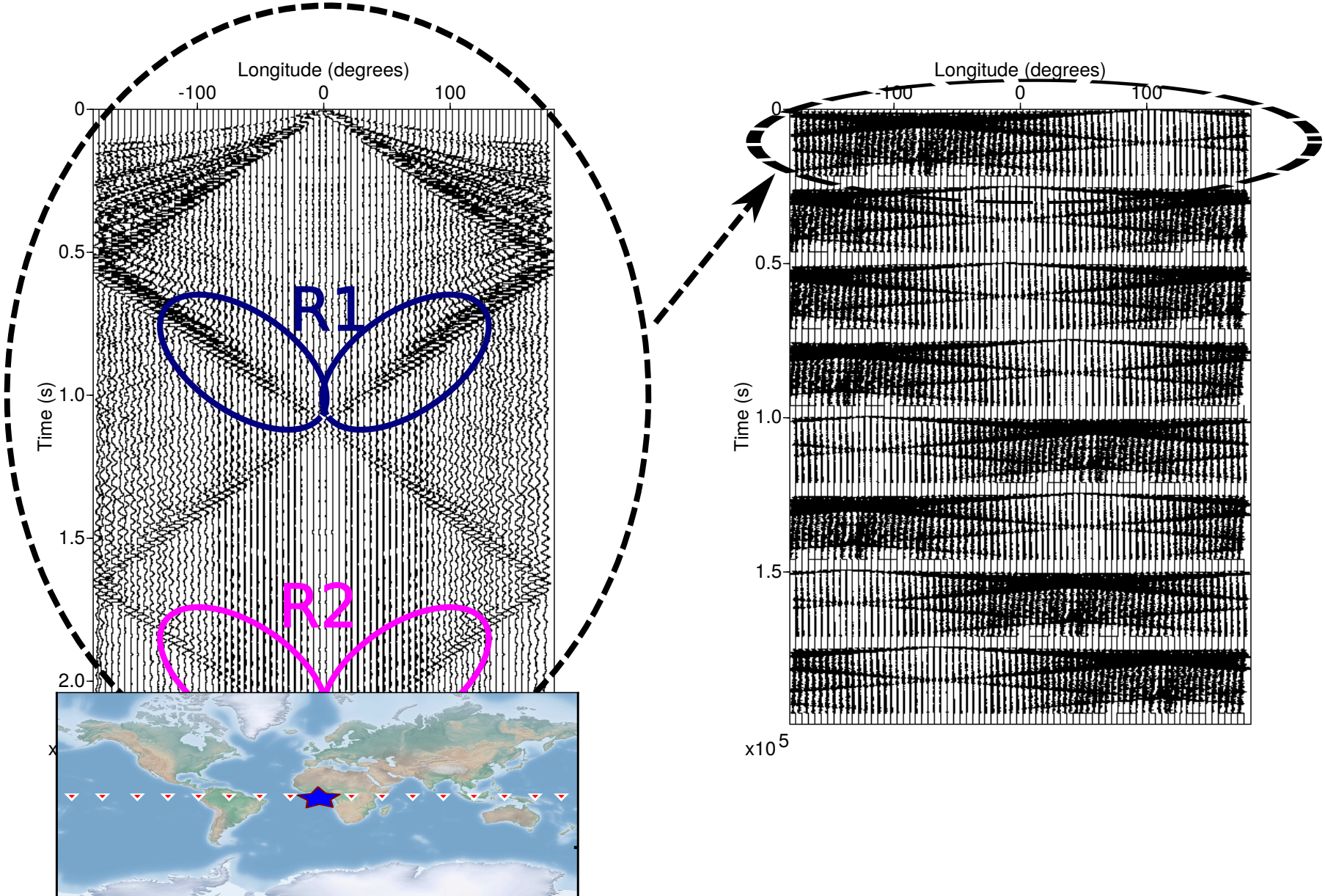


4^{th} Step – Identification of new detected events



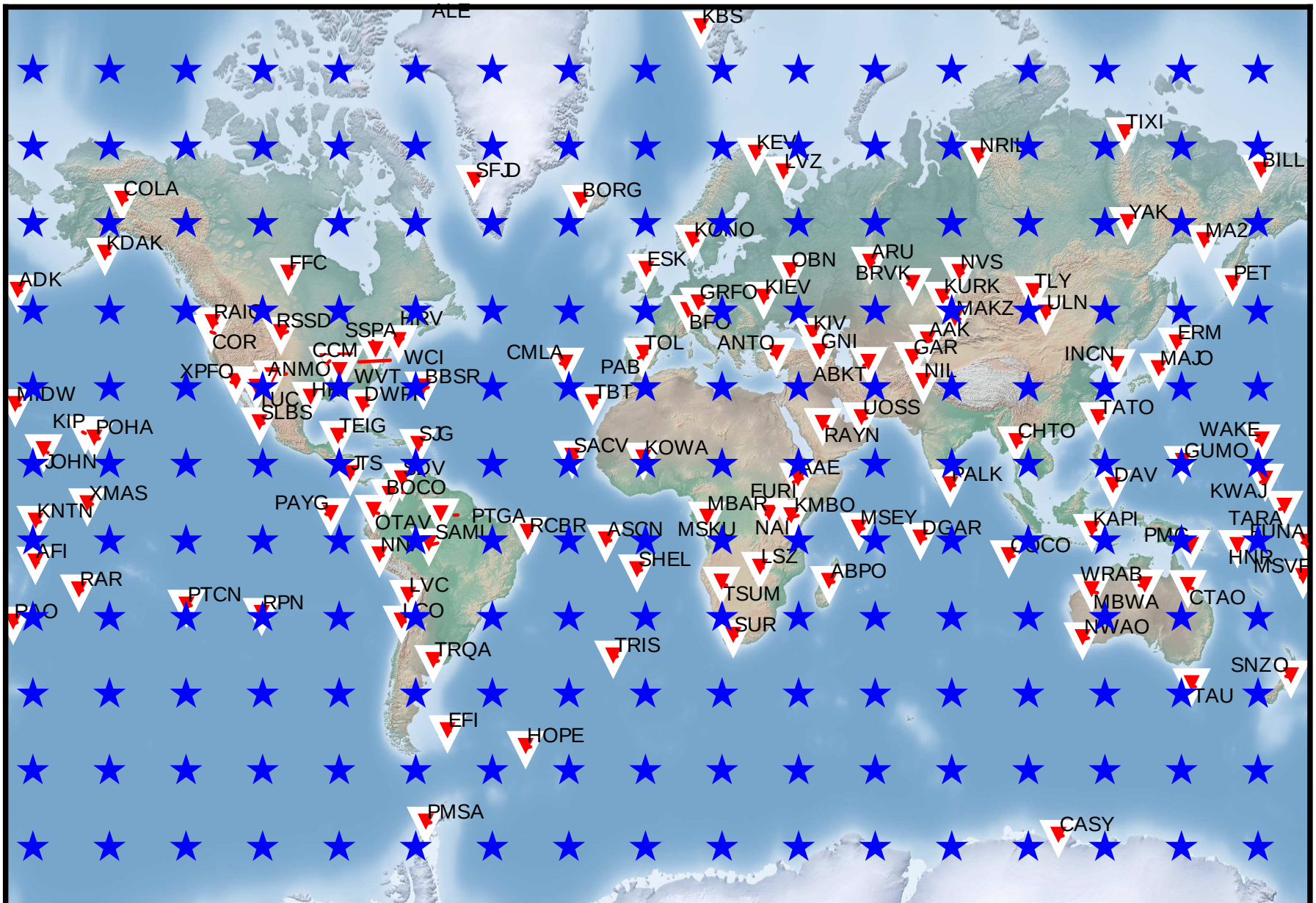
Detection & understanding of global long-period events

Using the FMF technique we plan to detect hidden global long-period events

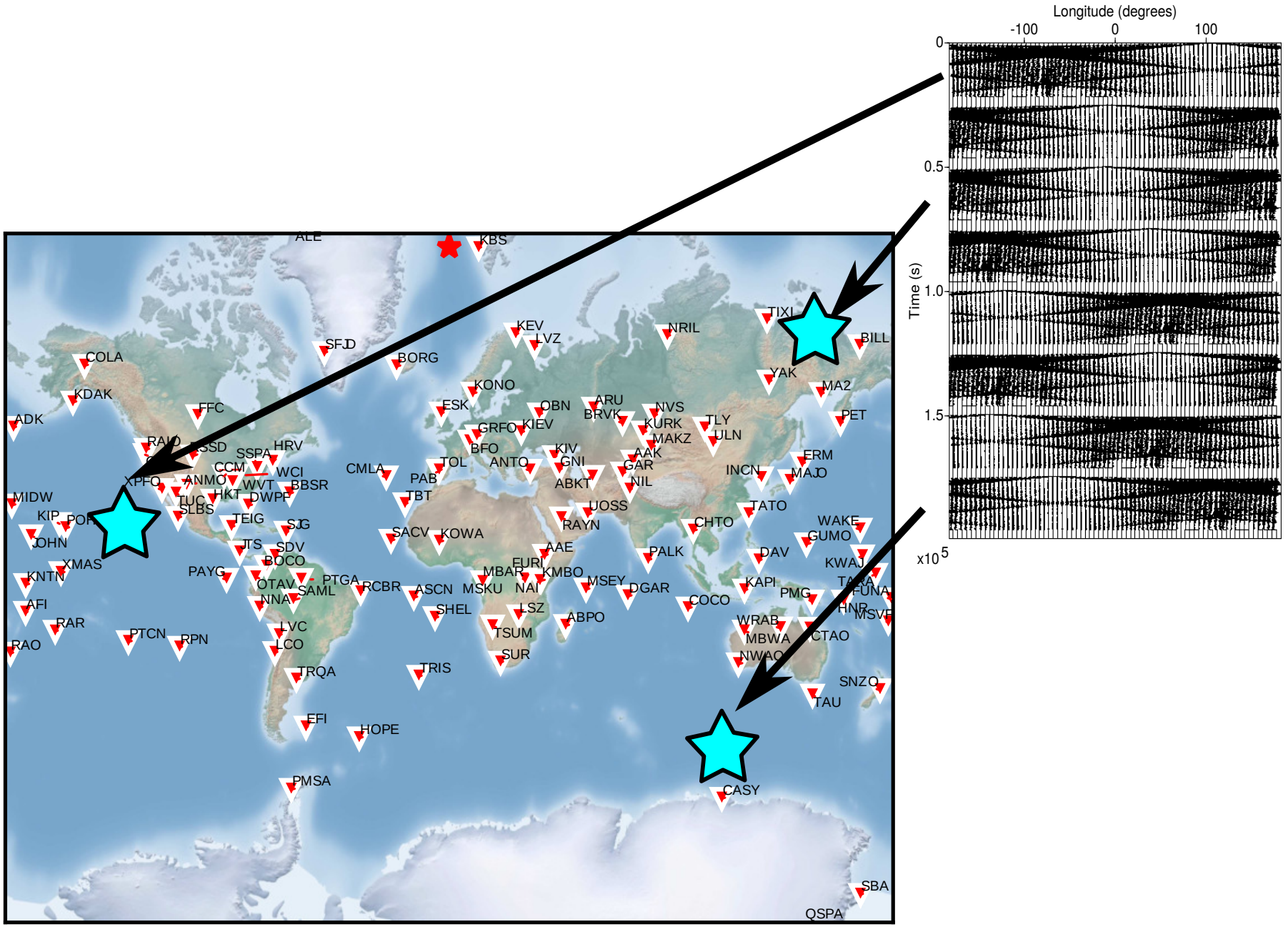


Analyzing continious data from all around the world

Analyzing continious data from all around the world



Detection & understanding of global events



Detection & understanding of global events

- What are these events?
- What are the characteristics of these events?
- What is the role that they play in the seismic cycle?

References i

Beaucé, E., Frank, W. B., and Romanenko, A. (2017). Fast matched filter (fmf): An efficient seismic matched-filter search for both cpu and gpu architectures. *Seismological Research Letters*, 89(1):165–172.

Frank, W. B. and Abercrombie, R. E. (2018). Adapting the matched-filter search to a wide-aperture network: An aftershock sequence and an earthquake swarm in connecticutshort note. *Bulletin of the Seismological Society of America*, 108(1):524–532.