

Repeater Detection

- Repeaters indicate aseismic fault slip (Uchida & Burgmann, 2019)
- This helper implement the repeater detection method in Zhou et al. (2022), which utilize both waveform similarity and location:
 - Waveform similarity is measured by CC of long window, covering both P & S waves
 - The location separation is constraint by $d(S-P)$, which is measure by CC of short windows separately for P & S.
 - A strict detection of repeating earthquakes would adopt parameters like (1) average $CC > 0.9$, and (2) $dt_{sp} \leq 0.01s$ for at least 3 stations, under a proper frequency band (Uchida, 2019)

Repeater Detection

- Input
 - eg_mess.pha: initial MESS detection
 - fpha_pal (eg_pal_hyp_full.pha): PAL phase file (templates for MESS)
 - eg_mess_cc.ctlg: final relocated MESS catalog
 - fsta (station_eg.csv): station file
- Output
 - eg_rep.clust: repeater sequences
 - eg_rep.pha: all repeaters

Input	Operation	Output	Notes
fpha_pal & fsta	run MESS	eg_mess.pha eg_mess_cc.ctlg	i.e. run PALM
eg_mess.pha	<i>run_clustering.py</i>	eg_rep-org_full.pha	find repeater candidates in MESS detections
eg_rep-org_full.pha	run MESS	eg_mess-rep.pha	detect with high CC threshold, e.g. 0.8
eg_mess-rep.pha	<i>run_clustering.py</i>	eg_rep.clust eg_rep.pha	using strict criteria, e.g. cc>0.9, dt_sp≤0.01s

References

- Uchida, N. (2019). Detection of repeating earthquakes and their application in characterizing slow fault slip. *Progress in Earth and Planetary Science*, 6(1), 1-21. <https://doi.org/10.1186/s40645-019-0284-z>
- **Zhou, Y.**, H. Yue, L. Fang et al. (2021). An Earthquake Detection and Location Architecture for Continuous Seismograms: Phase Picking, Association, Location, and Matched Filter (PALM). *Seismological Research Letters*, 93(1): 413–425. <https://doi.org/10.1785/0220210111>
- **Zhou, Y.**, H. Yue, S. Zhou et al. (2022). Microseismicity along Xiaojiang Fault Zone (Southeastern Tibetan Plateau) and the Characterization of Interseismic Fault Behavior. *Tectonophysics*, 833: 229364. doi: [10.1016/j.tecto.2022.229364](https://doi.org/10.1016/j.tecto.2022.229364)