

Investigating Muchiliao Fault Zone Structures by Using High Resolution Shallow Seismic Reflection Survey

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The active fault investigation is important for protecting precious lives and assets. A precise fault location can benefit the citizens by avoiding severe damage from the earthquake rupture and verifying the safety places to construct facilities. The Muchiliao fault is in the Tainan city, south-west of the Taiwan island. In the geology map, there is a clear linear structure cut through the local area, but no surface rupture has been found.

The high-resolution shallow seismic survey can provide more accurate images in a local area, which is a decent method for tracking faults in the near-surface area that can influence the public activities. The high-density of shot and receiver coverage can illuminate more detail structures than the industrial scale. We have completed one 2-D seismic profile with a total of 2140 meters in length and two Mini-vibes as the active source with 240 channel record system. The reflection signals are contaminated by strong air noise echoing between the mountains. To reduce the air burst, we adopt a framework “LIFT” which preserves the signal by separating the residual signal from the filtered noise.

The seismic profile illustrates several sequences of flat and continuous layers in the west and steep up into the east. Under the Muchiliao fault trace, though the reflection signal transit from continuous pattern into semi-continuous one, it is hard to recognize the displacement of the structure. According to the profile, we suggest that the Muchiliao fault is more likely to be a monocline or a fold structure, not an active fault.