



Earthquake relocation and focal mechanisms of $M > 6$ mid-crust earthquake sequences in Southwestern Taiwan

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There have been three mid-crust $M > 6$ earthquakes occurred in southwestern Taiwan during the last six years: the 2010 Jiashian earthquake, the 2012 Wutai earthquake and the 2016 Meinong earthquake with magnitude 6.42, 6.35 and 6.6, respectively. These events are all with mid- to lower-crustal focal depths and were rarely occurred in this region before the 2010 Jiashian earthquake. The strikes of the fault planes of these three events are in NNW-SSE direction, dipping northward and having similar focal mechanisms, showing ENE-WSW maximum compressive stress. The distribution of the aftershocks of the 2016 Meinong earthquake in particular were not only restricted to the main shock area, but also reached to 30 km away, the Tainan area. We use Matched Filter Technique (MFT) to detect more earthquakes from February 5 to May 26 and we totally found 4624 new events compared to 1238 original catalog events within this time period. We combine the catalog events and the newly-found events to perform relocation by the Double-Difference algorithm with waveform cross-correlation and 3-D velocity model; and determined 66 focal mechanisms for $M > 2.7$ events based on first motion and S/P amplitude ratio. According to waveform-HypoDD result, the mainshock area can be separated into three groups. Group 1 and group 2 show a shallow dip angle with focal depth between 15-20 km, which is consistent with the CMT inversion result and displays mostly left-lateral strike slip on the NW trending plane and NW-SE trending normal fault; and group 3 occurred three months after the mainshock and it was thought to be another NNW-SSE trending fault with steep dipping angle triggered by the mainshock. Moreover, the 30-km away Tainan area shows scatter seismicity distributed at a depth range of 23-26 km with mainly strike-slip faulting mechanisms striking on either E-W or N-S directions with NNE-SSW compression. We conclude that these mid-crust earthquake sequences occurred with similar focal mechanisms were resulted from the inversion of inherited normal fault, and it is likely to be connected to the Chishan transfer fault zone in the southwestern Taiwan fold-and-thrust belt. These earthquakes sequences are evidently basement-involved thrust faulting events in southwestern Taiwan.