Mud-core anticline responsible for anomalous deformation rate in SW Taiwan: Insight from 2016 Mw 6.4 Meinong Earthquake and numerical modeling

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Anomalous strain accommodation across the fold-and-thrust belt in SW Taiwan are revealed by the Continuous GPS, precise leveling and SAR interferometry. The previous block model based on GPS measurement suggested a high seismic risk in SW Taiwan. However, a clear evidence of multiple fault slip along a fold-and-thrust belt at 5-10 km depth was triggered by the 2016 Mw Meinong earthquake at 15-20 km depth. The primary coseismic fault slip was deduced with kinematic model based on seismic and geodetic measurements and triggered fault slip along the shallow fold-and-thrust belt was constrained by SAR interferometry. We hypothesize that the surface coseismic deformation is mainly controlled by a structure related to the shallow detachment at around 5-10 km depth, which a proposed duplex in a region of high pressure and high interseismic uplift rate might be sensitive to stress perturbations induced by moderate lower crustal earthquake. It is surprising to notice that the footwall of Lungchung fault demonstrates a high uplift rate of ~20-30 mm/yr in interseismic period. This anomalous deformation rate might part be related with a ramp duplex located in the footwall and the triggered slip of moderate earthquake in nearby area. In addition, the mechanical heterogeneity of mudstone in the Gutingkeng formation might play a crucial role of anomalous deformation. Consequently, we use an Efficient Unstructured Finite Element method (DynearthSol2D) to simulate and discuss the contrast of viscosity in mudstone and sandstone contributed in deformation pattern and upward mobility. We also want to check the previous hypothesis of mud diapirism and incorporate a new mud-cored anticline model for mechanic explanation of anomalous interseismic deformation occurred in SW Taiwan.

Keywords: mud-core anticline, SAR interferometry, seismic hazard

