



High mobility of mud-core anticline responsible for anomalous high deformation rate in fold-and-thrust belt of southwestern Taiwan

Jyr-Ching Hu (1), Ying-Ping Kuo (1), and Eh Tan (2)

(1) National Taiwan University, Department of Geosciences, Taipei, Taiwan (jchu@ntu.edu.tw), (2) Institute of Earth Sciences, Academia Sinica, Taiwan

Anomalous high strain accommodation across the fold-and-thrust belt in SW Taiwan are revealed by the Continuous GPS, precise leveling and SAR interferometry. It is surprising to notice that the footwall of Longchuan reverse fault demonstrates a high uplift rate of $\sim 20\text{-}30$ mm/yr in interseismic period. This anomalous deformation rate might part be related with a ramp duplex located in the footwall of the Longchuan reverse fault and the triggered slip of moderate earthquake in nearby area. A clear evidence of multiple fault slip along a fold-and-thrust belt at 5-10 km depth was triggered by the 2016 Mw 6.4 Meinong earthquake at 15-20 km depth. 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. In addition, the mechanical heterogeneity of mudstone in the Gutinggang formation might play a crucial role of anomalous deformation. Consequently, we use an Efficient Unstructured Finite Element method (DyearthSol2D) 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. The numerical predicts an uplift rate of ~ 10 mm/yr of active folding related to ramp duplex in the footwall of the Longchuan reverse fault. The uplift rate could reach to ~ 20 mm/yr with incorporating the high pressure zone in the ramp duplex and a backthrust of the in the footwall of the Longchuan reverse fault, which is in good agreement with the uplift rate from precise leveling. Thus we conclude that the high mobility of mud-core anticline responsible for anomalous high deformation in SW Taiwan.