Geophysical Research Abstracts
Vol. 19, EGU2017-11886, 2017
EGU General Assembly 2017


# Field Investigation of Surface Deformation Induced by the 2016 Meinong Earthquake and its Implications to Regional Geological Structures

De-Cheng Yi (1), Ray Y. Chuang (2), and Ching-Weei Lin (1)

(1) Department of Earth Sciences, National Cheng Kung University, Tainan, Taiwan, (2) Department of Geography, National Taiwan University, Taipei, Taiwan

We demonstrate mapping results of a newly-identified active folding-associated fault in southwestern Taiwan, which was triggered by the distant ML 6.6 Meinong earthquake in 2016. The 14.6-km-deep main shock occurred in Meinong at 3:57 (GMT +08) on February 6th while a series of 21-27 km deep aftershocks were induced after 160 seconds in Guanmiao, where is ∼25km NW away from the epicenter of the main shock. The focal mechanism of the Meinong main shock shows a westward oblique thrust with the fault plane of 275°/42°/17° (strike/dip/rake) but Guanmiao aftershocks show the N-S striking eastward normal movement. The study area locates at an on-going fold-and-thrust belt close to the deformation front of Taiwan orogeny with high rates of convergence, uplift and erosion. The geology of SW Taiwan is characterized by the ∼3-km-thick mudstones with high fluid pressure underlying the loose sedimentary rocks forming mud diapirs or mud-core anticlines. The significance of the Meinong earthquake is (1) aftershocks are far away from the main shock, and (2) the surface cracks partially distributed systematically along lineaments observed from InSAR, which has never been recognized as geological structures before. This study aims to establish possible kinematic processes of shallow deformation induced by the Meinong earthquake. We mapped surface cracks around the lineaments by using hand-held GPS and measured surface cracks by the compass and vernier.

Among 249 kinematic data measured from 244 observed surface cracks and ruptures, the type of deformation was mostly identified as dilation or lateral translation and only 4 data were compressional deformation. The overall surface displacement moved to the northwest and west, consistent with the regional coseismic movement. The opening of the surface cracks range from 0.5 to 105 mm and ∼85% of them are less than 10 mm. Preseismic deformed features such as failure of the retaining wall were also observed along the western and eastern boundary of the coseismic deformation area, indicating accumulated deformation and repeated structural activity in this area. In addition, we found a series of centimeters to meters long, N-S to N-W striking and eastern-side-down surface ruptures with the 4-19 cm heave distributed along the ∼4-km-long, nearly N-S striking and range-facing scarp with the 4-12 m height at the west of Guanmiao, where locate between the Chungchou anticline and Guanmiao syncline. We interpret these surface ruptures as a sign of the bending-moment fault associated with folding amplified by seismic energy through fluid-rich mud diapirs. Thus, seismic potential in this region needs to be re-evaluated, and the mechanism of seismic-induced amplification through high fluid pressure medium may play a critical role in assessing earthquake hazards in regions with similar geology to SW Taiwan.