Mapping of the Slip distribution and High Frequency Source Energy Radiation in South-Western Taiwan: Applications in 2016 Meinong earthquake

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High potential earthquake hazards must be considered in SW Taiwan due to the collision process still active beneath this area. On Feb. 6, 2016, a moderate earthquake (M_L=6.6; depth=14.6 km) occurred in Meinong, Kaohsiung area, Taiwan. Therefore, the main goal of this study is to investigate the rupture process of the 2016 Meinong earthquake and disaster implications beneath the SW Taiwan. In this study, the high quality strong motion data was used to invert the rupture image by the isochron method. This study uses the strong motion data which include the moderate earthquake to calculate the displacement and envelope energy ground motion records. We adopt the isochron synthetic method and recursive stochastic inversion to calculate the slip distribution of each small rupture and the energy radiation intensity on the fault plane. The results show that the earthquake is energetic and short in duration; with events confined in small source volumes with the faulting type is thrust with left slip. From the intensity of radiating energy pattern, we also observe that the source energy happens near the asperity. Our results strongly support the argument that high-frequency seismic waves occurs at the place where rupture stopped or at the fault area where has larger slip. In addition, we accurately determine the aftershocks, the related focal mechanisms, and the local stress tensor from the 3-D velocity model as well.

Finally, we also adopted the 3-D numerical method to estimate seismic responses for 3-D tomography structures with near surface layer. Therefore, we incorporated finite fault model which was derived from above procedure to the 2016 Meinong earthquake and simulated the seismic wave propagation through the reliable 3D velocity model. From the estimation of strong motion, the results serve as a guide in understanding what can occur when seismic wave propagate through coastal plain. Base on the above results, the important phenomena can be observed in this research which include the rupture directivity effect, obvious wave packets generated and the trapping of waves inside the soft layer produces long wave duration and high amplitude. Nevertheless, the constructed model parameters and strong motion response can play an important role in the estimation of probabilistic seismic hazard in urban areas.