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Near-fault Strong Motion Characteristics of the 2016 Meinong Earthquake in Taiwan

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The 6 February 2016 Mw 6.5 Meinong earthquake occurred at about 30 km southeast of the Tainan city in southwestern Taiwan with a focal depth of 14.6 km. It caused a fatality of 117 and damages on hundreds of buildings, indicating seismic vulnerability of a major city located near the seismogenic structures of southern Taiwan. This earthquake was caused by the rupture of a blind fault, while the rupture did not break to the surface, surface deformation occurred in several places along the regions with strong directivity effects. We chose seismic waveform from 12 high-rate GPS (50-Hz) and 53 strong motion stations (200-Hz) within 60 km epicentral distances to explore the characteristics of pulse-like velocity signals observed during the Meinong Earthquake. We used an approach of wavelet analysis (Shahi & Baker, 2014) to identify pulse-like velocities, and then 26 strong motion stations and 2 high-GPS stations recorded velocity pulses were identified. Orthogonal horizontal recording pairs are rotated to find the direction with maximum velocity pulses for each station. The results are divided into two groups according to the direction of maximum observed pulses. The group one dominating mostly south-north pulses is located near the right-lateral Hsinhua Fault and northwest to the epicenter. The second group with mainly east-west pulses occurs near the N-S-trending reverse, Houjiali fault which is west to the epicenter. The PGVs of group one decreased with distance from south to north (70 cm/s - 49 cm/s) and the pulse periods are between 1.4 and 2.6 seconds. The largest PGV (70cm/s) belonging to the nearest station from the epicenter was observed in the group one. According to the average of shear-wave velocity from the surface to 30 meters depth (Vs30), the foothills in southwestern Taiwan consists of dense soil and soft rock which results in the lowest periods (0.8 s) of the second closest station. The pulse periods in the group two are between 2 and 3.2 seconds sharing similar PGVs. The long period phenomenon in this area is caused by site effect. The change in the direction of the pulse is closely related to the pulse characteristics. Effective analysis of the near-fault pulse characteristics which play an important role in the potential earthquake disaster assessment, can help us understand the characteristics of faults with high seismic potential.