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# Coseismic and postseismic deformation of the 2016 Mw 6.5 Meinong, Taiwan, earthquake

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On 6 February 2016 southwestern Taiwan was struck by an Mw 6.5 Meinong earthquake which nucleated at the fold-and-thrust belt with the left-lateral and thrust motion at a focal depth of 14.6 km. The SW Taiwan is a NNE-SSW-trending thrust wedge, with a duplex arising from a major ramp adjacent to a northern boundary, the Hsinhua fault. South of the ramp, mud diapirs developed on the upper part of the wedge and terminated at the southern border, the Chishan fault. Both the Hsinhua and Chishan fault are right-lateral motion based on GPS observations. The coseismic displacements of the 2016 Meinong earthquake, from N to S, show counterclockwise rotation from NW to SW directions to the west of the epicenter with a maximum horizontal displacement of 39.2 mm. The coseismic vertical displacements indicate 5–35 mm uplifting west of the epicenter, with the highest value of 91 mm on the mud diaper anticline located 12 km W of the epicenter. The optimum fault geometry for the coseismic dislocation model indicates the strike of $293^o$, dip of $21^o$ and the depth of 25 km, with the main slip showing left-lateral with minor thrust motion at a depth range of 15-20 km. The calculated coseismic geodetic moment is $5.03\times10^{25}$ N-m and equivalent to $M_w$ 6.43. The coseismic deformation pattern appears to be controlled by the rupture directivity of the mainshock. The 13 months accumulated postseismic displacements reveal about 27.2 mm westward horizontal displacement and 5-39 mm vertical uplift displacements in the area south of the Hsinhua fault and north of the Chishan fault. The fault behavior of the Hsinhua fault and the Chishan fault appear to change following the Meinong earthquake, while the Hsinhua fault is accelerated and the Chishan fault is locked. The fault parameters of the inverted postseismic model is similar to the coseismic model, however the main slip distribution is surrounding the coseismic asperity with the left-lateral and thrust motion and extended to the shallower depth with thrust motion. The pattern of the postseismic deformation following the Meinong earthquake is likely controlled by the lithology and tectonics of SW Taiwan. The calculated postseismic geodetic moment is $7.59\times10^{25}$ N-m, which is 1.5 times of the coseismic geodetic moment. We assumed that the coseismic stress released by the Meinong earthquake is totally contributed from the afterslip mechanism of the postseismic elastic deformation in the asperity model. The moment magnitude contributed by the afterslip is $4.82 \times 10^{25}$ N-m which is only 63% of the postseismic moment magnitude release by this event. Therefore, we presumed that the coseismic stress triggered the inelastic process of the accretionary wedge south of the Hsinhua fault, where the postseismic creep occurred at the shallow sediments with thick mudstone. We suggest that earthquake events occurred at the accretionary wedge could trigger inelastic aseismic slip following the mainshock which resulted from lithology in place.