

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

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The 6 February 2016 M_w 6.5 Meinong earthquake ruptured an unknown fault with the left-lateral and minor thrust motion at the depth of 14.6 km in southwestern Taiwan, and resulted extreme disaster in the Tainan city. Analyses of GPS daily solution time series in SW Taiwan indicated 5-33 mm coseismic horizontal displacements located mainly in the Tainan-Kaohsiung area, and the coseismic deformation represents a fan-shaped pattern between 210° and 312° . The coseismic vertical displacements show uplifting from 8 mm to 58 mm west of the hypocenter and the maximum uplift is distributed at the Guanmiao-Lunchuan area. East of the hypocenter indicates subsidence from -7 mm to -13 mm. The three-month postseismic deformation indicates 10 - 15 mm horizontal displacements moving toward SW and vertical displacements of 5 - 20 mm are located in the Tainan-Kaohsiung area. The postseismic deformation showed differences between the south and north of the Hsinhua fault, where no apparent postseismic displacement recorded by the GPS stations located at north of the Hsinhua fault. The optimum fault geometry for the coseismic dislocation model indicates a strike of 295° and dip of 26° , and the main slip showed left-lateral with minor thrust motion at a depth range of 12-16 km and the maximum slip is 435 mm. The calculated coseismic geodetic moment is 8.69×10^{18} N-m and equivalent to M_w 6.59. For the postseismic model, two faults are inverted, the first one is the shallow fault plane, the main slip is concentrated at the depth of 7 - 10 km with the maximum slip of 94 mm and the fault strike and dip are 319° and 20° with thrust and left-lateral motion. The second one is the Hsinhua fault with the strike and dip of 79° and 70° , the fault slip is concentrated at the depth of 4 km and the maximum slip is 17 mm with right-lateral and reverse motion. The motion of the Hsinhua fault appeared to be reactivated by the 2016 Meinong earthquake as a slow slip event.

Keyword: Meinong earthquake, Coseismic and Postseismic deformation, Dislocation model, Tectonics of SW Taiwan