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A large prolonged postseismic deformation caused by slip on the high pore pressure decollement of the frontal thrust wedge

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The moment released by postseismic deformation of a large earthquake is typically smaller than its coseismic rupture, which the coseismic rupture should have released the main portion of the accumulated strain. However, it is not uncommon that the accumulative postseismic displacement is larger than or equal to the coseismic displacement based on geodetic observations on some subduction zone environments. The rational cause of such a large postseismic deformation may require a weakly coupled interface near the source rupture to allow prolonged large postseismic slip. Nevertheless, both the coseismic and postseismic deformation of subduction zone earthquakes are mostly derived from inversion of inland geodetic observations, yet the ruptures often occurred at the interface located mostly offshore, which resulted in poor resolution on the slip distribution model. Thus, whether unusually large postseismic deformation may occur on certain subduction zone earthquakes, and if so, what is the main cause of the large postseismic slip require further investigations on earthquakes with such an attribute. The 2016 Mw 6.5 Meinong earthquake occurred beneath the fold-and-thrust belt in SW Taiwan. Based on GPS observations, the two-years accumulated postseismic moment (Mw = 6.60) is larger than the coseismic moment (Mw = 6.43) of the 2016 Meinong earthquake, which renders a paradigm for large postseismic deformation of an earthquake occurred beneath a frontal thrust wedge. We consider that the large postseismic deformation of the 2016 Meinong earthquake is likely activated by slip on the high pore-pressure detachment on the frontal thrust wedge. On the detachment the high pore-pressure fluid overlapped with ∼5-km thick sediments, diffused slowly and caused prolonged postseismic deformation observed in SW Taiwan. Some unusually large postseismic deformation are likely caused by activations of localized high pore-pressure mud diapirism, including the one located above the coseismic rupture.