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The velocity effects of large historical earthquakes in Chinese mainland

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Accompanying with the collision between Indian and Eurasian plates, China has experienced decadal large earthquakes over the past 100 years. These large earthquakes are mainly located along several seismic belts in Tien Shan, Tibet Plateau, and Northern China. The postseismic deformation and stress accumulation induced by the historical earthquakes is important for assess the contemporary seismic hazards. The postseismic deformation induced by historical large earthquakes also influences the observed present day velocity field.

The relaxation of the viscoelastic asthenosphere is modeled on a layered spherically symmetric earth with Maxwell rheology. The layer's thickness, the density p and the P-wave velocity *Vp* are from PREM. The shear modulus are derived from the p and *Vp*. The viscosity between lower crust and upper mantle adopted in this study is 1×10^{19} Pa·s.

Viscoelastic relaxation contributions due to 34 historical large earthquakes in China from 1900 to 2001 are calculated using VISCO1D-v3 program developed by Pollitz (1997). We calculated the model predicted velocity field in 2015 in China caused by historical big earthquakes. The pattern of predicted velocity field is consistent with the present movement of crust, with peak velocities reaching 6mm yr^{-1}. The region of Southwestern China moves northeastwards, and also a significant rotation occurred at the edge of the Tibetan Plateau. The velocity field caused by historical large earthquakes provides a base to isolate the velocity field caused by the contemporary tectonic movement from the geodetic observations. It also provides critical information to investigate the regional stress accumulation and to assess the mid-term to long-term earthquake risk.