



Slip distribution of the 8 September 2017 Chiapas, Mexico earthquake using teleseismic inversion and tsunami modeling

Mohammad Heidarzadeh (1), Takeo Ishibe (2), and Tomoya Harada (3)

(1) Department of Civil and Environmental Engineering, Brunel University London, London, UK (mohammad.heidarzadeh@brunel.ac.uk), (2) Association for the Development of Earthquake Prediction, Tokyo, Japan (ishibe@erc.adep.or.jp), (3) Earthquake Research Institute, the University of Tokyo, Tokyo, Japan (haratomo@eri.u-tokyo.ac.jp)

A great earthquake occurred offshore Chiapas, Mexico on 8 September 2017 having a moment magnitude (M_w) of 8.1. This earthquake generated a moderate tsunami with coastal wave heights of 1-2 m which was the first tsunami hitting Mexico in 22 years. The earthquake focal mechanism was normal faulting and hence the 2017 Chiapas tsunami was among few tsunamis worldwide generated by normal-faulting earthquakes. In this study, we used 18 tsunami and 76 teleseismic waveforms to estimate the slip distribution of the Chiapas earthquake. The tsunami data included both tide gauge and DART (Deep-ocean Assessment and Reporting of Tsunamis) records and the teleseismic data included both P and SH waves. In our method, we changed the rupture velocity (V_r) from 1.5 to 4.0 km/s and conducted teleseismic body-wave inversion for both nodal planes (NP). Such a practice resulted in 12 slip models for which forward tsunami simulations were performed for all. The best slip model was selected based on the NRMS (normalized root-mean square) misfits between observations and simulations. Our results revealed that the steep nodal plane gives better results than the low-angle nodal plane. The optimum V_r was 2.5 km/s in our study. The best slip distribution has a length and width of 130 and 80 km, respectively. The maximum and average slip values are 13.1 and 3.7 m, respectively. Our slip model results in seismic moment and magnitude of $1.91E21$ Nm and 8.1, respectively. According to Coulomb stress transfer analysis, future large interplate earthquakes could be enhanced in the region following the Chiapas earthquake.