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Fault Mechanism and Tsunami Simulation of September 08, 2017 Mexico (M_w 8.2) Earthquake

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We estimated source mechanism parameters, non-uniform finite-fault slip distribution model and numerical simulation of tsunami waves generated by 08 September 2017 Mexico earthquake (M_w 8.2). This destructive earthquake occurred at the location where Cocos, North America and Caribbean Plates meet at a triple junction on Middle America Trench. Along the western coast of Central America, the Cocos plate subducts towards the east beneath the Caribbean plate resulting high rate of seismicity and diverse active volcanoes (Molnar and Sykes, 1969).

We performed point-source and finite-fault slip-inversions by using teleseismic ($30^{\circ} \leq \Delta \leq 90^{\circ}$) long-period P- and SH-, and broad-band P-waveforms recorded by the Global Digital Seismograph Network (GDSN) stations. Source parameters, faulting area, maximum and average displacements, rupture duration and stress drop value are determined from point-source and finite-fault source models of the earthquake. The obtained results indicate a normal faulting mechanism with a small strike-slip component for this tsunamigenic earthquake. For numerical simulations, we used Cornell Multi-grid Coupled Tsunami Model (COMCOT), which adopts staggered leap-frog finite differences to solve shallow water equations in their linear and non-linear form (Liu et al., 1998; Wang, 2009). The methodology includes modeling of the initial wave height, simulation of tsunami wave propagation and calculation of the maximum wave heights near coastal areas. Tsunami wave propagations and the major effects of tsunami waves on nearby coastal plains are simulated by calculating the vertical dislocation on the seabed based on the obtained earthquake source mechanism parameters and non-uniform finite-fault slip distribution model. Then, tsunami simulation results have been compared with the available real-time tide gauge records located on near-field coastal plains and Deep-Ocean Assessment and Reporting of Tsunami (DART) buoy records.

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