

Near-regional CMT and multiple-point source solution of the September 5, 2012, Nicoya, Costa Rica Mw 7.6 (GCMT) earthquake

Abstract

We use acceleration data from the Observatorio Vulcanológico y Sismológico, Universidad Nacional de Costa Rica (OVSICORI-UNA) and Laboratorio de Ingeniería Sísmica, Universidad de Costa Rica (LIS-UCR) seismic network for the relocation and moment-tensor solution of the September 5, 2012, 14:42:03.35 UTC, Nicoya, Costa Rica earthquake (Mw 7.6 GCMT). Using different relocation methods we found a stable earthquake hypocenter, near the original OVSICORI-UNA location in the Nicoya Peninsula, NW Costa Rica at Lat 9.6943°N, Lon 85.5689°W, depth 15.3 km, associated with the subduction of the Cocos plate under Caribbean plate. Acceleration records at OVSICORI-UNA and LIS-UCR stations (94–171 km), at $0.03 < f < 0.06$ Hz were used in the waveform inversion for a single-point centroid moment tensor (CMT). Using spatial grid search the centroid position was found at the depth of 30 km, situated at Lat 10.0559°N, Lon 85.4778°W, i.e. of about 41 km NNE from the epicenter. The centroid time is 14:42:18.89 UTC, i.e. 15.54 s later relative to the location-based origin time. The nodal plane (strike 318°, dip 27° and rake 115°) is the fault plane that agrees with the geometry of the subducted slab at Nicoya, NNW Costa Rica. Increasing the maximum studied frequency from 0.06 to 0.15 Hz, the multiple point source inversion model leads to two subevents. The first one was located near the centroid and the second subevent was situated 20 km along strike and 10 km down dip from the first subevent and 6 s later. The uncertainty of the source model was carefully examined using complementary inversion methods, *viz* the iterative deconvolution and non-negative least squares.

[To view the article click here.](#)