Slip Distribution of the October 23, 2011 Van Mw 7.1 Earthquake Obtained from Regional and Teleseismic P Waves Using the Empirical Green Function Method

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We obtained a kinematic finite-fault rupture model for the October 23, 2011 Mw 7.1 Van earthquake using Empirical Green Function (EGF) method. We used an Mw 6.0 aftershock which occurred 10 hours later than the main event as the EGF event. The analysis was performed for two distance ranges; regional (1° - 20° distance) and teleseismic (20° - 90°). Stations were selected to have good azimuthal coverage and high S/N levels as well as the similarity of the waveforms between the mainshock and the EGF event. Data from 36 regional and 32 teleseismic stations were used. The deconvolution was performed in the time domain and the source time functions from 3-component recordings were stacked to increase S/N. The shapes of the source time functions varying with the azimuth of the stations were mapped into the spatial evolution of slip. The inversion of the source time functions was performed with rupture velocities of 1.5, 2 km/s , 2.5 km/s and 3 km/s and the rise times of 0.5 s, 1.0 s and 2.0 s. Finally the source model was tested by evaluating the difference between the original source time functions and the synthetic source time functions which were predicted by forward modeling. Teleseismic and regional slip distributions are consistent. The slip distribution shows that the fault rupture propagated up-dip towards northeast. The maximum slip is approximately 3 m and the rupture velocity is between 2 and 2.5 km/s.