Source Modelling of the 2010 Elazıg / Turkey Earthquake

Yunus Emre Bulbul, Barbaros Cetiner, and Gülüm Tanırcan

Boğaziçi University, KOERI, Istanbul, TurkeyTurkey (yemregs@hotmail.com)

Source modelling of the March 8, 2010 Elazığ/ Turkey Earthquake (Mw:6) was performed by the Empirical Green's Function Method to estimate size and location of an asperity and average rupture velocity inside the asperity. This is the largest earthquake that occurred at the Bingol-Elazığ Segment of the East Anatolian Fault Zone since 1971 Bingöl Earthquake (Mw:6.8). Elazığ Earthquake affected mainly rural areas of the city. 30000 people are affected from the earthquake and 42 people lost their lives.

In order to simulate mainshock of Elazığ Earthquake, strong motion recordings of one aftershock (Mw:4.9) at 1201 and 2303 stations are utilized. The depth of the target and element events is 4 km and 6 km, respectively. N and C values which are asperity dimension and stress drop ratio between mainshock and aftershock are calculated 5 and 2, respectively through spectral analysis of S-wave portion of records. Due to the noise contamination on the records, simulation is carried out for different frequency intervals for stations. Frequency range of the simulation is limited to 1 Hz - 5Hz for 1201 station and 0.5 Hz-1 Hz for 2303 station. A single asperity area is assumed throughout the calculation.

Asperity size, rupture starting point and rupture velocity inside the asperity has been changed by performing several simulation and final values were decided based on minimum residual values of synthetic and observed displacement time series. Results indicated that rupture propagated inside the asperity with sub-shear velocity that equals 2.8km/s. The asperity area is calculated as 20.25km2 and hence, rupture area of the earthquake is estimated as 92km2 from self similar source scaling relationships