



Kinematic Rupture Process Of Karakocan-Elazig Earthquake, Eastern Turkey

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An earthquake ($M_w=5.9$) hit Elazig in the eastern part of Turkey on March 8, 2010 at 02:32 (GMT). It is located midway between the provincial capital of Elazığ and Bingöl with coordinates reported as 38o48.42N and 40o5.99E by Bogazici University Kandilli Observatory and Earthquake Research Institute (KOERI). Source characterization and slip history were estimated the main and four moderate size earthquake almost at the same location. The earthquake occurred at one of the tectonically very active East Anatolian Fault zone starts at the Karlıova triple junction, where it meets the North Anatolian fault to the NE. Multi time-window linear waveform inversion technique (MTWIT) was applied to strong ground motion (SGM) data. Theoretical Green's functions between subfaults and stations were calculated by a Discrete Wave Number Method (DWNM) using 1-D velocity structure. Inversion technique used in this study yields a non unique solution. Therefore various rupture models have been tried until both observed and synthetic data were matched. Results show simple patterns in slip distributions. Maximum slip is 0.78 and seismic moment is $1.435E+25$ dyne.cm from the kinematic rupture process of the strike slip faulting. In this study, we searched a stable 1-D crustal velocity model with low RMS misfit to construct the theoretical Green's function between each sub-fault and each station among the 4 different models. These are Preliminary Reference Earth Model (PREM; Dziewonski and Anderson, 1981), International Association of Seismology and the Physics of the Earth's Interior (IASP91) (Kennett and Engdahl, 1991), Kandilli Observatory and Earthquake Research Institute (KOERI) earthquake location model, explosion model (Gurbuz, 2004). We have collected previous studies Rebollar et al., (2001), Ichinose et al., (1997), Abdel-Fattah (2002), Somerville et al., (1999), Wells and Coppersmith (1994) on source information of moderate size earthquakes occurred worldwide and compared with our results. Results were compared with those of similar size earthquakes around the world and a new empirical relationship was proposed between seismic moment and rupture area. We expect our findings provide usefull information to resolving rupture mechanisms and triggering of the events in Eastern Anatoion Region.

Key Words: Rupture Process, Elazig Earthquake, Eastern Turkey