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Aftershock Triggering and Estimation of the Coulomb Stress Changes with Approach of Optimally Oriented Fault Planes: Examples of Some Contemporary Earthquakes in Turkey

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The Coulomb Stress changes due to the some moderate and large earthquakes are shaped according to the orientations of reciever faults or weakness zones along the corresponding seismogenic zones. In some cases, the determination of the fault plane parameters (e.g. length, width, strike, dip) of the receiver faults are more difficult due to the tectonical complexity of the region. Therefore, in order to understand the aftershock distrubition in such areas Coulomb stress changes can be calculated under the assumption of optimally oriented fault planes which increases the spatial correlation between stress changes and aftershock distribution. In the scope of the present sutdy, aftershock distrubiton of some contemporary earthquakes in Turkey (Simav (Mw 5.8), May 2011; Van (Mw 7.0), Oct 2011 and Gulf of Fethiye (Mw 6.1), June 2012) and their coulomb stress changes were correlated. Fault plane parameters of these earthquakes which suggest three different types of focal mechanism were calculated using moment tensor inversion technique and aftershock location data in a period of 30 days for each corresponding events were taken from Kandilli Observatory and Earthquake Research Institute (KOERI) catalog. The focal mechanisms of the selected earthquakes represent normal, strike slip and thrust faulting for the earthquakes of Simav, Gulf of Fethite and Van, respectively. Coulomb Stress Changes were calculated using the open source Matlab based (Coulomb 3.3) codes. The calculations were performed by assuming Poisson's ratio and apparent friction coefficient to be 0.25 and 0.4, respectively. The coulomb stress variations were calculated at fixed depths for each event and aftershocks were selected as $\pm$4 km for corresponding depths. Keeping in mind that the increase of static stress more than 0.5 bar can cause the triggered events in an area, the accordance rates of Coulomb stress changes and aftershock distribution under different tectonic regimes were disscussed. The accordance rates are %84, %80 and %68 in the extensional, strike slip and thrust type faulting, respectively.

Keywords: Aftershock Distribution, Coulomb Stress Changes, Fethiye, Optimally orientad fault planes, Simav, Van