# The effect of heterogeneous crust on earthquakes:a case study of the 2011 North Nagano earthquake

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We investigated the effects of heterogeneous crustal structure on earthquake rupture of the 2011 North Nagano earthquake. Using a 3D crustal structure model (Matsubara et al.,2008) we calculate stress distribution by solving static equation of motion. The finite difference method with grid size of 0.1km is used, where the computational space is 100km x 100km x 50km. Displacement boundary condition is applied. Since absolute value of boundary displacement is unknown, relative values of stress components, and the stress ratio, i.e., (fault shear stress) / (fault normal stress) are discussed. Because (stress ratio) = (stress drop) / (normal stress) −dynamic frictional coefficient, the ration roughly indicates normalized stress drop. We found high stress ratio region seem to be overlapped the fault asperity. It suggests that the earthquake could have been created by a heterogeneous stress field generated from heterogeneous crustal structure.

Keywords: crustal structure, fault stress, asperity

 