Modeling stress field around the 2016 Kumamoto earthquake sequence (M7.3) from seismic moment tensor data (3)

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The 2016 Kumamoto earthquake sequence (maximum magnitude 7.3) occurred in the Beppu-Shimabara area, Kyushu, Japan. The sequence was located at one of the highest background seismicity region in the Kyushu Island. Pre-state of stress in this area revealed spatial heterogeneous feature and the largest earthquake fault slipped to follow the maximum shear stress direction on the fault under the heterogeneous stress. In addition, behavior of the faults having complex geometry created stress heterogeneity although average stress level should decline due to the earthquake occurrence. In this study, we attempt to model of the stress field around the 2016 Kumamoto earthquake from seismic moment tensor data before and after the occurrence. Strong spatial stress heterogeneity detected in this region as pointed out by previous studies. Spatial regional stress pattern did not change after the earthquake occurrence except area just around the co-seismic fault. The change in deviatoric stress tensor associated with the co-seismic fault slip have been detected around fault. Considering co-seismic stress change, we estimated the differential stress less than few tens MPa. In addition, the stress concentration at the faults before the earthquake was expected about half magnitude of the released stress. These result suggests that stress condition in the hypocentral area of the sequence is complex and unstable due to low stress and strong heterogeneity.

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