A Multiple Point Sources Study on the 2016 Kumamoto Mw 6.2 Earthquake

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The Kumamoto M_w 6.2 earthquake on April 14, 2016, which has been the first event in the 2016 Kumamoto earthquake sequence, occurring about one day before the M_w 7.1 mainshock, shows significant complexity of its source. To understand the rupture history of the M_w 6.2 earthquake, we employ a multiple-point-source inversion under the Markov Chain Monte Carlo (MCMC) scheme, where the earthquake rupture is decomposed into a set of point sources and each point source has respective focal mechanism, location, moment magnitude, rupture time and source duration. We use an Mw5.4 aftershock, which can be consider as point source, to calibrate the paths to all the strong motion stations within 100km. The calibration helps us to understand the sensitivity of the local velocity structure to the frequency we are using in the multiple point source inversion. The optimal model consists of three point sources with comparable moment magnitudes, indicating the moment of this earthquake was released three times from various part of the fault rupture. These three point sources are distributed around the intersection area of the Futagawa Fault and the Hinagu Fault, and the focal mechanisms are consistent with the fault geometry that is inferred from the relocated aftershocks, which dips to the southeast in the middle apart and dips the northwest on the two side of the intersection area. The full moment tensor obtained by adding the contribution from each point source indicates a strong CLVD component, which is in agreement with the point source full moment tensor inversion result using the F-net and strong motion stations.

Keywords: Kumamoto Earthquake , Multiple point source , MCMC inversion

