Determination of source parameters for the 2016 Gyeongju earthquake sequence

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The M_L 5.8 earthquake, the largest instrumental earthquake in the Korean Peninsula, occurred near Gyeongju which is located in the southeastern Korean Peninsula at 11:32:54 (UT) on 12 September 2016, and numerous aftershocks occurred for a lengthy period of time. Since the Korean Peninsula is located in intraplate region, has relatively low seismicity and small size earthquake than the plate boundary region, the 2016 Gyeongju earthquake sequence is considered to be somewhat exceptional phenomenon. In this study, we analyzed earthquakes, occurred between September 2016 and April 2018, to reveal the geometry and kinematics of causative fault which is corresponding to the earthquake sequence. The hypocenter parameters were determined by the VELLIPSE location algorithm. The hypocenter parameters are distributed along NNE-SSW trending with steeply dipping ESE with ~ 70° between the Yangsan and Deokcheon faults. Focal mechanism solutions were determined by the method using the P-wave first motion polarity and waveform inversion. Most of determined focal mechanism solutions show dominantly NNE-SSW trending dextral

strike-slip fault plane that dips approximately 70° and the plane perpendicular to it. The fault planes, showed NNE-SSW tending with a dip of ~70°, is followed the distribution of hypocenters. Stress inversion using the focal mechanism data shows that the maximum principal stress axis is horizontal with ENE-WSW direction. As a result, it is inferred that the Gyeongju earthquake sequence was generated by movement of a NNE-SSW oriented dextral strike-slip fault, dipping approximately 70° to southeast.