Migration of seismic scatteres before and after the 2016 events in Southeastern Korea

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Crustal heterogeneity related to seismic fault was revealed by spatial scattering difference by coda envelope inversion, developed by Nishigami (1991). This method, however, has not applied to migration of seismic scatters due to difficulty in detecting the appropriate time of change in tectonically active regions. In 2016, the M_L 5.8 Gyeongju Earthquake (GE) may present temporal variation of southeastern Korea because this region was stable area without M5 class events over several centuries. After GE, seismicity increased and the M_L 5.4 Pohang earthquake occurred in this region on 2017. For the period of before GE and after GE including origin time, 97 and 110 earthquakes (M2) provided 590 and 818 coda traces, respectively. These were recorded as vertical component on 196 stations. In S-wave coda observations, numerous seismograms showed large amplitude reverberations caused by reflections at free surface (RFS): 214 and 378 for the period of before GE and after GE including origin time, respectively. Coda time window avoided RFS by shifting starting coda time as 2 times the *S*-wave traveltimes, which were originally as 1.5 times. The maximum length of window was <40 s as the *S*-wave traveltimes, which appears to be limit time to reduce the effect of multiple scattering. The residuals were averaged in windows of $\delta t = 0.5$ s. The study region were selected for 35.5 to 36.5˚N and 128.5 to129.5˚E with a depth of 50km, and the volume was divided into 20´20´10 blocks with about 5 km on one side. Heterogeneities of each blocks were obtained not only *S*-to-*S*-wave conversion but also reflection at free surface from each source. The ray paths were obtained by ray method for the model with 4 crustal layers with *S*-wave velocities for 3.29, 3.45, 3.85, and 4.55km/s separated at depths of 5.1, 16.7 and 31.9 km. The observations were solved using the simultaneous iterative reconstruction technique (SIRT). SIRT with iterations of 2389 showed the remarkable difference between before GE and after GE including origin time (Figure). Relatively high scattered area correlated with topography for before GE, regardless of Gyeongju and Pohang earthquake zones which are land areas within a radius of 20 km centered on two events, respectively. This correlation became weak for after GE including origin time, and the higher values were observed for the earthquake zones. This variation may reflect the effect of two moderate earthquakes.

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