

P wave scatterer distribution around the focal region of the 1995 Hyogo-ken Nanbu earthquake from active seismic experiment

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The spatial variation of the heterogeneity in the seismogenic layer and the lower crust affects the behaviour of stress accumulation. Therefore, it is important to reveal the detailed distribution of heterogeneity in the crust for the purpose of understanding the generating processes of inland earthquakes. Following the 1995 Hyogo-ken Nanbu (Kobe) earthquake, which is one of disastrous inland earthquakes for several decade, the Research Group for Explosion Seismology (RGES) carried out a refraction seismic experiment in the northern part of Awaji Island in order to investigate the detailed structure around the focal region (RGES, 1997). Demachi et al. (2004) applied semblance technique to these seismograms, and estimated P-P scatterer distribution in and around the focal region. In this study, we conducted synthetic tests to examine the resolution of our method. We synthesised scattered waveforms from uniform and random scatterer deployments. These data sets were analysed by using the same procedure as actual analysis. The results of the tests revealed the estimation errors were approximately 1-2 km within 10 km of the profile lines and 3-5 km at a distance of 20-30 km from the profile lines.

We estimated the spatial distribution of P wave scatterer with considering the results of the synthetic tests. Scatterers were located beneath the central part of the island at a depth of 22-27 km and in the western side of the investigated area at a depth of 27-32 km. However, the definite image of scatterer was not found in the upper and middle crust at a depth of 0-20 km. The scatterer distribution implies heterogeneity in the lower crust is varied locally.