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Estimation of bedrock depth in Beijing, China, using microtremor array analysis
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In order to draw the bedrock geological map in plain area of Beijing, we conducted array measurements of microtremors at eight sites in city Beijing and its adjacent area to estimate deep S-wave structures and obtained their pre-Cenozoic bedrock depth.

We use three aperture arrays with different radii between 40 to 300m at each observation site to collect the microtremor data and estimate the phase velocities of the fundamental mode of the Raylegh waves from the vertical components at each site by using the SPAC (Spatial Auto-Correlation) method (Aki, 1957). The estimated frequency ranges for the phase velocities were about 0.3~3.9Hz. The 1-D structure models down to a depth of about 3 km were estimated by fitting of the observed and the theoretical phase velocities through a nonlinear inversion using a genetic algorithm (GA) (Cho et al., 1999).

The results reveal that the deepest bedrock located in Beijing rift, the depth is 1510 m, and the shallowest depth is only 170 m, located in Laiguangying uplift. The difference of the pre-Cenozoic bedrock depth between eight sites in plain area of Beijing is about 1300 m. The depth of the bedrock surface has changed dramatically, related to different tectonic units. Since the deep S-wave velocity structure of Beijing City and its adjacent area had been basically unknown, we delineate it for the first time in this article using array measurement of microtremors.

キーワード: bedrock depth, array measurements of microtremors, spatial auto-correlation method, estimate deep S-wave structures, plain area of Beijing, China
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