Study on Deep Structure and Earthquake Generating Properties in the Yamasaki Fault Zone Using Dense Seismic Observation Data

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We have been estimating deep heterogeneous structure and earthquake generating properties in the Yamasaki fault zone, which is a left-lateral strike-slip active fault with a total length of ˜80 km in southwest Japan. We deployed dense seismic observation network, composed of 32 stations with average spacing of ˜5-10 km in and around the Yamasaki fault zone. We will estimate detailed fault-zone structure such as fault dip and shape, segmentation, and possible location of asperities and rupture initiation point, as well as generating properties of earthquakes in the fault zone, through analyses of accurate hypocenter distribution, focal mechanism, 3-D velocity tomography, coda wave inversion, and other waveform analyses. We also deployed a linear seismic array across the fault, composed of 20 stations with ˜15-20 m spacing, in order to delineate the fault-zone structure in more detail using the seismic waves trapped inside it. We will also estimate detailed resistivity structure of the fault zone by AMT (audio-frequency magnetotelluric) and MT surveys.

As preliminary analyses, we estimated distribution of accurate hypocenters, b values, velocity perturbation, and scattering coefficients around the fault zone using the routine network data. For the scattering analysis, for example, we analyzed 411 wave traces from 31 events, which occurred in 2003, recorded at 27 stations, and we estimated a distribution of scattering coefficients along the Yamasaki fault zone. Microseismicity is high and scattering coefficient is relatively larger in the upper crust along the entire fault zone. The distribution of strong scatterers suggests that the Ohara and Hijima faults, which are the segments in the northwestern part of the Yamasaki fault zone, have almost vertical extension from surface to the depth of ˜20 km. These results will be improved by adding temporary dense network data.

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