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Seismic reflection profiling across the Median Tectonic Line active fault system, south of Osaka, SW Japan

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The Median Tectonic Line (MTL) is the most significant inland fault in SW. The western part of the MTL shows late Quaternary right-lateral strike-slip movements at several mm/y along the 500-km-long segments. The deep geometry of MTL active fault system is crucial for the estimation of strong ground motion in the southern part of the Osaka plain, which population is 9 million. To reveal deeper geometry of fault surface, seismic reflection profiling was performed in 2006. The seismic source was vibroseis trucks. Three shooting patterns were employed: 10-m spacing shooting by single truck for the toe part of the active faults, 80-m spacing shooting by four vibroseis trucks for a whole seismic line and 100 stationary vibroseis sweeps at six sites. Common mid-point reflection profiles and velocity models by refraction analysis clearly demonstrate the geometry of the MTL down to 6 km. In spite of the late Quaternary strike-slip movement, the fault surface dips northward by 20 degrees (shallower than 1 km in depth), 30 degrees (1-2 km in depth) and 40 degrees (2-6 km). Judging from the growth strata in the footwall Pliocene sediments, formation of shallow low-angle fault is due to reverse faulting during 3 -1 Ma. Based on the results of seismic profiling across Shikou Island, SW Japan, it is highly probable that the MTL cut the whole crust at moderately N-dipping surface. The bottom of the seismogenic zone beneath the Osaka plain is about 15 km. Thus, the seismogenic source fault extends to the southern part of the Osaka plain. The MTL shows parallel geometry with internal reflectors in the footwall metamorphic rocks (Sambagawa belt), suggesting that the fault was formed in the same tectonic processes in the Cretaceous recorded in the metamorphic belt and preserved its original geometry up to recent through the process of fault reactivation.