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Preliminary results of tectonic geomorphological and geological researches on the Uemachi fault zone in Osaka, Japan

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We re-examined the distribution and shallow fault structure of the Uemachi fault zone. The Uemachi fault zone extends in the densely built-up area of Osaka and surrounding region, therefore, the long-term forecast of the future large earthquake and the strong ground motion prediction is necessary to evaluate various aspects for seismic hazards assessment. We conducted precise mapping of tectonic geomorphological features by tectonic geomorphological and geological survey including airphoto interpretations, geomorphological analysis using high-resolution LiDAR DEMs, extensive field work and re-evaluation of previous data. The newly-found evidence for tectonic geomorphic features is summarized as follows. Firstly, the high-resolution DEMs and related field works successfully revealed the distribution of uplifted delta relief along the northern portion of the Uemachi fault zone, which was estimated as concealed active faults in precious studies. The carbon 14 ages obtained from the top-set delta deposits, ~2500 y.B.P, probably postdate the timing of the most recent paleoearthquake. Secondly, previous studies mapped the distribution of the Sakuragawa flexure and the Suminoe flexure beneath the city central of Osaka as two blanching faults apart from the main Uemachi fault zone, however, we proposed these flexures are connected into single shallow structure as a sub-parallel frontal flexure zone along the main fault zone. The spatial distribution of flexures and the shallow fault structure are inferred from the borehole stratigraphy data as well as probable uplifted alluvial lowland shown in the high-resolution DEMs relief images. Thirdly, we re-examined the existence of the inferred active fault along the present coast line, extending far southwest from the southern termination of the Uemachi main fault zone. Along the estimated fault trace, the deformed fluvial/marine terraces are partly recognized as fault bulge or pressure ridge and back-tilt toward the mountain side. These tectonic geomorphic features support the existence of the inferred active fault along the coast line, in accordance with the cumulative deformation of anticline/monocline in Plio-Quaternary sediments imaged by P-wave seismic reflection survey. The spatial extent of the fault trace along the coast line and deeper fault structure is necessary to be further explored for seismic source models and the following strong ground motion simulations.

Keywords: active fault, paleoseismology, Uemachi fault zone