

Fault-related landform of the active faults along the western margin of the Nagano basin

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We constrained subsurface fault geometry of the active faults along the western margin of the Nagano basin at Kusama and Komatsubara-Dannohara by trenching and drilling surveys, in order to understand coseismic evolution of fault-related landform. At Kusama, an up to 6-m-high tectonic bulge has been preserved on and parallel to the basal part of the SE-facing 40-m-high fold scarp. We obtained 32 drilling cores with lengths of 1 to 50 meters, and excavated a trench with a depth of 4 m. We then projected the logs to a line perpendicular to the tectonic landforms. Considering the subsurface geologic structure constrained, we suggest that 1) the primary NW-dipping fault plane has not broken through the ground surface, 2) instead, an active warping structure has been formed during the Holocene, 3) this warping has been cut by active several secondary reverse faults dipping to the SE, and 4) the secondary faults have played important roles in the evolution of the an up to 6-m-high tectonic bulge. Timing of the latest two surface faulting on the secondary faults is estimated to be just after AD688-887 and after AD1417. The latter faulting would be correlated to the 1847 Zenkoji earthquake. At Komatsubara-Dannohara, we excavated a 22-m-long and up to 4-m-deep trench across a several-ten-meters-high east-facing tectonic scarp, and then obtained 3 drilling cores just north of the trench with lengths of 10 to 15 meters. Surprisingly, we identified an east-vergent active wedge thrust structure located basin-ward 10 to 15 meters apart from the basal part of the scarp. Timing of the latest two surface faulting is estimated to be between BC354 and AD1616 and after AD1515. The latter faulting must be associated with the 1847 Zenkoji earthquake. This is because the patterns of surface rupture reconstructed from the distinctive geologic structure are well concordant with the contents of historical documents reporting the rupture during the 1847 Zenkoji earthquake at Komatsubara-Dannohara.