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Timing of the last four paleoearhquake events on the Okaya fault along the ISTL active fault system, central Japan

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We performed paleoseismic survey on the Okaya fault along the ISTL active fault system. The ISTL active fault system is well-known as one of the most hazardous fault systems based on the previously-reported paleoseismological works. In particular, the Gofukuji fault has the highest activity of the ISTL active fault system, The Okaya fault is the next fault section of the Gofukuji fault to the south, hence, the seismic potential of the Okaya fault is extremely important to estimate the size and rupture extent during the next large earthquake if the Gofukuji fault fails. The trench site is located at the base of the previously-mapped fault scarplet along the Okaya fault. The trench exposures show us clear faults cut fluvial terrace deposit and alluvium with humic back marsh deposit. Several colluvium deposits are also distinguishable over almost vertical fault planes. Judging from the relations between upward fault terminations and deposits, we identified four paleoearthquake events. All four events recorded relative subsidence forming 10-m-wide depression near the foot of fault scarplet. Additional borehole sections indicate the depth of depression is about 7 meter, and its timing of formation is after the deposition of the terrace gravel bed. The existence of depression and relative subsidence show normal faulting, but the negative flower structure and reverse faulting on some faults suggest that the Okaya fault at the site has both normal and strike-slip faulting sense. The timing is individual paleoearthquake events is still under way, but those four events occurred after the deposition of K-Ah volcanic ash that erupted in ˜7200 years B.P. The most recent event may have occurred after 1800 years. This date contradicts with the previously-reported data on the Okaya fault as well as the adjacent Chino fault. Since the largest fault segment boundary exists between the Okaya fault and the Chino fault, further refinement of the paleoseismic history and slip per event are necessary in order to improve long-term forecast of the next earthquake along the ISTL active fault system.

Keywords: active fault, paleoseismology, Itoigawa-Shizuoka Tectonic Line, historical earthquake