

Holocene faulting history of the Kamishiro and Eastern Matsumoto Basin faults on the northern ISTL active fault system

Tadashi Maruyama^{1*}, Shinji Toda², Koji Okumura³, Masashi Omata⁴, Yorihide Kohriya⁴,
Yoshiki Mori⁴, takaaki iwasaki⁵

¹AFERC, AIST, ²DPRI, Kyoto Univ., ³Dept. of Geography, Hiroshima Univ., ⁴INA Co., Ltd., ⁵IAS

In order to reconstruct Holocene behavior of the northern part of the Itoigawa-Shizuoka Tectonic Line active fault system (ISTL), we conducted paleoseismic investigations containing arrayed boreholes and trenching across the Kamishiro fault and East Matsumoto Basin fault (EMBF) in late 2009. Arrayed boreholes at Taira, southernmost part of the Kamishiro fault, revealed the west-facing monoclinical warping of Holocene strata with progressive deformation. We recognized three event horizons on the basis of stratigraphic and structural features suggestive of paleoearthquake event, such as eastward tapering beds that fill the structural relief. ¹⁴C ages allow to constrain timing of each event: postdates 750 BC (possibly postdates AD 660); between 2480 BC and 1700 BC; between 3350 BC and 2870 BC. We could not find evidence of paleoearthquakes in the beds in ages ranging from ca. 9 ka to 5 ka, which suggests temporal clustering of faulting during the Holocene period. Paleoseismic trenching at Kemi-kita, middle portion of the EMBF exposed a west facing monoclinical warping accompanying with distinct east-dipping low-angle thrusts at its basal part. From several lines of evidence for paleoearthquakes, we succeeded in detecting multiple events (at least two and possibly three events) in the Holocene for the first time. Because of remarkable variation of the ¹⁴C ages even in same unit depending on the different kind of materials dated, timing of each event is difficult to constrain well. When we used only dates from charcoal samples, we tentatively constrained the timing of events as follows: between AD 690 and AD 890; (possible event: between 2280 BC and AD 890); between 2570 BC and 2040 BC. Our results, combined with previous studies, suggest the possibility that the over 60 km section from the Kamishiro fault, northernmost portion of the east-dipping reverse slip predominant north segment of the ISTL, to the Gofukuji fault, northernmost portion of the strike-slip predominant middle segment, was ruptured simultaneously during the historical earthquake(s); AD 762 or AD 892 events. But, timing of the events prior the most recent event and frequency of the events may show that the rupture of the northern part was usually different from the middle part. The paleoseismic study plays an important role on understanding spatio-temporal rupture behavior of complex fault zone such as the ISTL.

Keywords: paleoearthquake, ISTL active fault system, Kamishiro fault, East Matsumoto Basin fault, Holocene