

トレンチ調査からみた十日町盆地東縁断層の 変位様式と活動履歴

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Paleoseismology as Deduced from the Trenching Data in the Eastern Marginal Fault of the Tokamachi Basin, Located in the Thrust and Fold Belt in Central Japan

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Abstract

The Eastern Marginal Fault of the Tokamachi Basin is located on the right bank of the Shinano River, the longest river in Japan, in the Niigata area, within the Neogene fold and thrust belt of central Japan. The activity of this fault is partly responsible for the formation of the Tokamachi tectonic basin. The fault zone is composed of several subparallel fault branches that strike N-S to NNW-SSE and deformed late Pleistocene to Holocene fluvial terraces. These fault branches are characterized by west-facing scarps with some subsidiary east-facing scarps to the east of the basin. Although the destructive 2004 and 2007 earthquakes occurred in the northern part of this fold and thrust belt, no historical rupture has been recorded in the Tokamachi Basin. To obtain paleoseismic records in this tectonically formed basin, we excavated four trenches across different fault branches. The Banba South, Banba North, and Shinmiya trenches are located across the west-facing scarps, and the Miyakuri trench is on an east-facing

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scarp. Fault exposures and deformed terrace deposits are present in these four trenches. These results confirm that these geomorphic scarps are indeed produced by faulting.

At the Banba S trench, three fault traces that have nearly horizontal to very shallow dipping fault planes with upthrown side on the east are present, and show clear evidence of the latest event at *ca.* 3,500–3,100 yrs BP (BC 1,965–1,630 to BC 1,505–1,145). A penultimate event possibly occurred at after *ca.* 11,000 yrs BP. (BC 11,810–9,800), although its exact timing is not determined. At the Banba N trench, the terrace deposits of *ca.* 5,300 yrs BP (BC 4,225–3,965) are deformed. This suggests the age of deformation is younger, and probably coincides with the latest event at the Banba S trench. At the Shinmiya trench, the late Pleistocene terrace is divided into two parts by a flexural scarp, probably produced by a blind reverse fault. The scarp is formed prior to 14,000 yrs BP (BC 14,710–13,700). In addition, a younger event is recognized to have occurred between 9,400 and 8,900 yrs BP (BC 8,555–8385 to BC 8,000–7,910). In contrast to those trenches on the west-facing scarps, trench logs at Miyakuri, located on an east-facing scarp, show possibly two events with relatively steep fault planes during the last 32,000 yrs. The latest activity at Miyakuri occurred between 9,500 and 7,400 yrs BP (BC 8,955 to BC 6,365–6,045), but the age of the penultimate event cannot be precisely determined. However, we suggest that the faulting interval at Miyakuri is longer than that of other fault branches. In summary, from this study, we can identify at least three paleoseismic events, namely, I, II, and III, and a possible event IV for the Eastern Marginal Fault of the Tokamachi Basin. Event I is clearly identified at Banba S and N trench. Three faults probably moved simultaneously by Event II. Two other events are only recognized locally. Faulting on the west-facing scarp is more frequent and has a high slip rate, reaching nearly 1 m/ky.

Key words : Eastern Marginal Fault of the Tokamachi Basin, trench survey, paleoearthquake, reverse fault, the latest timing of activity, Shinano River, fluvial terrace, radiocarbon dating

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