

Paleo-seismological survey on the Futagawa fault at Futa, Nishihara Village, Kumamoto prefecture

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After the 2016 Kumamoto earthquake, paleo-seismological surveys were conducted not only on the Futagawa fault but also on the subsidiary surface ruptures. Our group conducted the paleo-seismic trenching on the subsidiary surface ruptures, focusing on the coincidence between the primary and subsidiary faults. We already excavated two trenches: Miyaji trench (Ishimura et al., 2018) on the small surface ruptures 10 km far from the eastern end of the primary fault and Komori Farm trench (Ishimura et al., 2019) on the Idenokuchi fault running parallel to the primary fault. These paleo-seismic trenching revealed that these faults moved repeatedly in the past and their recurrence intervals were estimated to be 2-3 thousand years, indicating that the activity of these subsidiary surface ruptures coincided with that of the Futagawa fault as same as the 2016 Kumamoto earthquake. On the other hand, paleo-seismic event age of the Futagawa fault is not well constrained although many trenches were excavated on it (Kumahara et al., 2017; Iwasa et al., 2018; Shirahama et al., 2018; Tsutsumi et al., 2018; Ueta et al., 2018; Toda et al., 2019). Thus, we conducted the trench survey at Futa, central part of the Futagawa fault to reveal paleo-seismic age, especially younger than K-Ah tephra (7.3 ka; Machida and Arai, 2003) and to compare the event ages between the primary and subsidiary faults.

We conducted the paleo-seismic trenching at Futa where the Futagawa fault crosses the Futagawa river. At the outcrop along the Futagawa river, Ishimura (2019) identified the main fault of the Futagawa fault displacing the lava and sediments from the Late Pleistocene to Holocene and subsidiary faults showing smaller displacement than the main fault. The trench site is ca. 50 m east from this outcrop. We identified two surface ruptures on the trench site: the north strand shows 30-40 cm north-up normal faulting and the south strand shows left-stepping, en echelon cracks. We totally excavated five trenches on two surface ruptures.

As a result, we identified at least three events including the 2016 event after K-Ah tephra consistent with the previous studies. At present, we are conducting radiocarbon dating and thus will show the details of faulting events and event ages in the presentation.

Keywords: 2016 Kumamoto earthquake, Futagawa fault, Paleo-seismological survey, K-Ah tephra