

A review of the probabilistic hazard assessment of Futagawa fault before the 2016 Kumamoto Earthquake

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The 2016 Kumamoto Earthquake (MJMA 7.3) was the first earthquake that had been evaluated before the occurrence of that earthquake by HERP (the Headquarters of Earthquake Research Promotion). They published reports of the long-term probability of the Futagawa and Hinagu fault zones in 2003 and 2013. In the later report, they calculated 30 years probability of the occurrence of the earthquake as nearly 0-0.9 %, whereas the time collapse rate was 0.08-0.9. Active Fault Database of AIST shows 6 % of 30 years probability and 1.44 of time-collapse rate. These rates were calculated based on the paleoseismological data with geological surveys at two sites (Tanaka and Shirakawa-ugan) along Futagawa fault.

At the Tanaka site, Kumamoto Prefecture and AIST conducted paleoseismological trench surveys in 1998 and 2007. These surveys showed that the age of the last faulting event occurred between 13,000 and 2,200 yrBP and the average interval of fault events was 8,100-26,000 yrs. And Kumamoto Prefecture (1998) showed the average slip per event was 1.7-2.3 m of the right lateral displacement. At the Shirakawa-ugan site, NUPEC (1998) showed the age of the occurrence of the last faulting was after 6,900 yrBP. As a result of these paleoseismological surveys, HERP evaluated that the age of the last faulting event was between 6,900 and 2,200 yrBP and average interval was 8,100-26,000 years.

The 2016 Kumamoto Earthquake was accompanied by surface fault with length of ca. 30 km and maximum displacement of ca. 2 m along Futagawa fault and northern part of Hinagu fault zone. At the Tanaka site, surface fault appeared on the same point as the fault on the trench walls, but amount of displacement was ca. 50 cm of a right lateral sense. This field evidence means that the long-term evaluation by HERP based on trench survey at Tanaka was an overestimate value for the amount of slip and an underestimate value for recurrence intervals.

References

- HERP (2013), Long-term evaluation for Futagawa and Hinagu fault zones, http://www.jishin.go.jp/main/chousa/katsudansou_pdf/93_futagawa_hinagu_2.pdf
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