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The reverse faulting of Kurehayama fault accelerated?

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Kurehayama fault is located in the western margin of the Toyama Plain, central Japan. This fault is 29km long and runs from the mountainous Yatsuo town through the downtown of Toyama City into Toyama Bay, Japan Sea. The activity history of the Kurehayama fault and the geologic structure around this fault have been investigated by using the reflection survey method (Investigation Committee of Active fault at Toyama Prefecture,1997; Kaneya, 2001). In the present study, the fault configuration up to about 900m in depth was depicted by the balanced cross section around the Kurehayama fault. Also, the formation process and displacement velocity of both the fault and related anticline (Yasuda anticline) were examined quantitatively. As the result, this paper reports the following findings.

(1) Geologic structure around Kurehayama fault
By reprocessing the reflection profiling data , it was made clear that the late Pliocene group contact with the middle Miocene at a depth of 200-300m in the foot wall. The result from restoring geological structure during the earliest Quaternary (2.6Ma to 2.0Ma) revealed that the dip of Kurehayama fault changed from 41 degree NW to 50 degree NW at a depth of 500m . Thus, the activity of Kurehayama Fault, which started as a normal fault in the Miocene epoch, was ceased or stagnated at the Pliocene, and the reverse faulting began at the earliest Quaternary (2.6Ma-2Ma).

(2) Acceleration of reverse faulting of Kurehayama fault
According to the restoring the geologic structure of the Kurehayama fault at time when the accumulated vertical displacement was 125m, the vertical displacement velocity was 0.06-0.09m/ka and the horizontal tightening velocity of the Yasuda anticline was0.014-0.025m/ka during the period 2.6-0.6 Ma. While, since 0.6Ma, the vertical displacement velocity of the Kurehayama fault is 0.21 m/ka and horizontal displacement velocity of the Yasuda anticline is 0.039 ~ 0.071 m/ka. This indicates that , the reverse faulting of Kurehayama fault and horizontal tightening of the Ysuda anticline have accelerated 3 ~ 4 times.

(3)Beginning of active tectonics
Timing to which the reverse fault movement of Kurehayama Fault and formation of the fault-related fold are accelerated seems common to the history of the active tectonics in various areas of southwest Japan including the Atotsugawa fault system. It is future tasks to clarify the relation to the initiation of the Niigata-Kobe strain concentration belt as well as the appearance of the Present regional tectonic stress field and volcanic activity.

Keywords: active fault, displacement velocity, fault-related fold, inverted structure, tectonic zone, active tectonics