

HDS029-P06

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Holocene activity of the Kuwana fault, Central Japan

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In order to verify whether the periodicity in the activity of the active intraplate fault, we estimated the Holocene activity of the Kuwana fault based on the facies analysis and the 52 accelerator mass spectrometry (AMS) ¹⁴C dates from drilling cores.

In Naruhashi et al. (2008) and Naruhashi et al. (2011), five vertical slip events during the 5,000 years (7,000 yrBP-2,000 yrBP) was detected by comparing changes in the depositional rates in cores from both the hanging wall and footwall of the fault (Altitudinal difference curve: ADC). Those ages of seismic events were approximately 6600 cal yBP, 5700 cal yBP, 4000 cal yBP, 3600 cal yBP, 2100 cal yBP, A.D.745, and A.D.1586. The recurrence interval of the large earthquakes produced by Kuwana fault was 1039 years in average, and the average slip rate of the fault during the last 7000 years was approximately 1mm/y represented by the inclination of regression lines of ADCs.

Two time-displacement diagrams were constructed based on the displacement and the age of seismic event that had been calculated from ADCs for two pairs of No.200-No.350 and No.275-No.350. It is uncertain whether diagrams of the Kuwana fault follow time-predictable model.

The regeneration process model was made using the cumulative distribution function based on estimated event ages. The accumulation frequency is approximated with lognormal distribution, and is different from exponential distribution (Poisson process). This indicates that the Kuwana fault does not generate large earthquake randomly, but rather repetitively.

Based on lognormal distribution, the standard deviation of recurrence intervals for the Kuwana fault is 477 years, the relative aperiodicity (value in which standard deviation is divided by mean value) was 0.46. It is less than 420 years from A.D.1586 year when the Kuwana fault faulted at the end, thus each probability of earthquake within 30, 50, and 100 years in the future became 7.5, 8.8, and 12.4% respectively.

Keywords: Kuwana fault, Holocene, displacement, recurrence model, reverse fault