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SSS28-21 Room:A04 Time:May 28 14:45-15:00

Reevaluated age of the latest activity of Ushikubi fault with ESR method using calcite proportion in calcareous gouge

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The Ushikubi fault with a recurrence interval of 4-5 ka (Miyashita et al., 2004b) is a 52 km long, NE-SW dextral trending fault and composes of a complex network of active faults in central Japan. Because active faults in Japan have become a major threat to the location and re-running of the nuclear power plants in the country, various methods have been employed to unravel their fault histories and to determine ages of their recent activities. According to previous radiocarbon dating of overlying contact, the latest activity of this fault is about 1 ka while a close age of 1.9 Ka has been obtained directly from calcareous fault gouge using the ESR method (Fantong et al., 2013).

Although ESR ages obtain from defect centers in quartz grains are always greater than 10,000 yrs, age determination of the recent movement of the Ushikubi fault using calcite proportion in the mixture could give a relatively younger and more precise age. This is because defects from calcites have a younger dating range and therefore may be appropriate for determining the age of the most recent fault activities. Accordingly, the main aim of this investigation is to reevaluate the age of the Ushikubi fault based on the proportion of calcite in the samples and also to verify additive dose rate dependency on the ESR signal intensities.

The calcite proportion from the mixture was estimated using calibration curves constructed from known concentrations of pure quartz and calcite obtained from XRD diffractograms. The equivalent doses were estimated using the additive dose method and the annual dose rates (adopted from Fukuchi et al., 2002) were calculated from the concentrations of radioactive elements. Calibration curves revealed that the proportion of calcite in the samples range from 26-37% and 9-17% in the central and eastern part of the Ushikubi fault respectively. Although no great discrepancy was observed in the equivalent dose and the signal intensity upon addition of artificial irradiation (50 Gy/hr and 20 Gy/hr), the equivalent dose determined from some of the samples irradiated at 20 Gy/hr was slightly larger. The average age obtained from these proportion range from 0.75 - 1.15 ka (50 Gy/hr) and 0.88 - 1.2 ka (20 Gy/hr). These ages are in good agreement with that determined by radiocarbon dating (1 ka) (Miyashita et al., 2004b).

References

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Miyashita, Y., Yoshioka, T., Nikaido, M., Takase, N. and Tachibana, T., (2004b): Paleoseimological surveys of the Northeastern part of Ushikubi fault on Toyama/Gifu prefectural border-A trench excavation survey at kamishirakimine site. Annual Report on Active Fault and Paleoearthquake Research, 4: 131-142 (In Japanese with English abstract).

Keywords: ESR, Calcareous fault gouge, Calcite proportion, Ushikubi fault, Active fault