Luminescence measurement of quartz from Nojima Fault Trench

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1. Introduction
The Southern Hyogo prefecture earthquake occurred by the activity of the Nojima fault in 1995. The southeastern side of this fault was uplifted by 1.4 m with horizontal displacement of 2.1 m along the fault to southwestward. In this study, we investigated the effect of fault activity on luminescence signal and estimated dose in quartz from samples from trench of Nojima fault.
2. Luminescence measurement
In this study, the blue thermoluminescence (BTL) often observed for dating of granite-derived quartz sample and the ultraviolet region thermal luminescence (UV-TL) which is the same emission wavelength as the OSL method were measured. Luminescence signals are reset by heating or bleaching (Obata et al., 2015). When considering the temperature and time conditions necessary for resetting the signal, the τ value (the average lifetime) is calculated as an index of the time required for attenuation of the signal under a certain temperature. This temperature and time condition is very low and short compared with ESR and K-Ar methods. Therefore, this method has a potential to specify the latest activity of fault (Ganzawa et al., 2013).
3. Peak temperature of TL signal
The luminescence sites and their emission temperatures were determined by T-Tmax method perfomed by 10 ˚C interval. The host rock collected from Rokko granite (Host rock) and the granite sample (E1) collected about 5 m away from the gouge in trench were measured. As a result, the peak emission temperatures were 200 ˚C, 270 ˚C and 320 ˚C. These values were concordant for BTL and UV-TL.
4. Luminescence signal for granite
Quartz was extracted from Host rock, and several samples from the trench with different distance from the fault. Then, each TL emission curve was obtained. The shape and intensity of these signals are different among samples.
Furthermore, the signal growth rate against amount of dose were also not constant for each peak in all samples.
5. Dose of samples from trench
The dose (Gy) of each sample was calculated for each luminescence site after peak separation of the emission curve. Different peaks showed different dose values in all the samples. The dose estimated by peak at 200 ˚C showed the minimum value.

Keywords: luminescence dating, quartz, active fault

