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ESR dating of the Quaternary fault movements

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We investigated time pattern of Quaternary fault activity at scales range from a few meters to a few kilometers using the ESR (electron spin resonance) dating method. Some fault rock zone along the fault system was reactivated, producing well-defined bands of fault rocks. Fault rock bands can be divided into four types based on the behavior of strain hardening and strain softening. A type I fault rock zone is characterized by strain hardening: new fault gouge band are formed next to the older host fault gouge band. Type II fault rock zone are developed by strain softening: reactivated fault gouge bands are confined within the older host fault rock zone. The entire fault rock band is reactivated in a Type III fault rock zone. New fault rock bands are branched off from the older host fault rock band by strain hardening in the Type IV faulting mode. Local variations of deformation environments make these faulting modes vary along the given fault and during the history of fault movements. ESR dates obtained from each bands of fault rocks show distinct ESR dates whose sequences agree with geological evidences. ESR dating of fault rocks can be used to evaluate the potential seismic hazards to main structures near the Quaternary fault zone.