

Activated timing of Yangsan fault in Korea; Preliminary results for establishing the time-scheme of tectonic episodes since the Cenozoic Era

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Yangsan fault, the major fault in the southeastern Korean Peninsula, is the key tectonic line to understand the tectonic evolution of the Korean Peninsula since the Cenozoic Era. It is because the Yangsan fault is known to be an active fault, to have been reactivated since the Cenozoic Era, and to be closely related to the opening of East Sea. Here we firstly present that a timing of activated event of Yangsan fault by using combined approaches of the optimized illite-polytype quantification, the K-Ar age-dating, and the recently developed illite-age-analysis (IAA) approach for the fault gouges from Sangcheon-ri area of Yangsan main fault line. Using high-speed centrifuging technique, we separated the gouge samples into 3 grain size fractions of <0.1 μ m, 0.1-0.4 μ m, and 0.4-1 μ m. All size fractions were dialyzed and were freeze-dried. The relative proportions of 2M₁ illite were determined by using the iterative full-pattern-fitting method between the measured XRD patterns for each size fraction and the generated ones using WILDFIRE© simulation for variable populations of the illite-polytypes in the 2 θ range of 15°~40°(Cu-K α radiation). R% value ($(\sum |(\text{simulated}-\text{measured})/\text{simulated}|)/n \times 100$) was employed to define the accuracy of the full-pattern-fitting. The iteration was continued until the R% value reached in minimum. We tried to make the final R% values of all fractions to be less than 10%. From 3 fault gouges, we preliminarily determined one chronological record of brittle fault-activation event at about 42~ 46 Ma. It should be crucial to understand the regional processes that drive tectonics to form Yangsan fault, and if the dating results were added for other sites, it would be possible to establish the tectonic episodes and their periodicity of Yangsan fault.