# Faulting-promoted illitization along the megasplay fault in the Nankai Trough

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The transformation of smectite to illite is thought to have important role on faulting because illitization can change friction strength and produce fluid overpressure by dehydration reaction. We performed X-ray diffraction analyses of sediment samples around the megasplay fault in the Nankai accretionary prism, recovered from Integrated Ocean Drilling Program (IODP) Expedition 316 Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE). Quantitative analysis of the illite fraction in illite-smectite mixed layers (I-S) crystallites shows that the dark gouge has ~10% more illite content than that in the host rock. If applying a kinetic expression obtained under a static condition from the previous works, the observed mineralogical anomaly requires an event of frictional heating that have caused temperature rise to an extraordinarily high level around the dark gouge. We combined data from XRD analyses with modified kinetic simulations of illitization to quantify effect of mechanochemical processes. As a result, if we applied an activation energy ~30% lower than the value from the previous works, illitization can be reasonably explained by frictional heating. These results suggest that seismic slip helped to overcome kinetic barrier due to mechanochemical processes in the fault zone.

Keywords: Subduction zone, Fault gouge, Frictional heating

 