Micro-tectonics of the tsunamigenic frontal thrust in the Nankai Trough

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The Nankai Trough is formed by the northwestward subduction of the Philippine Sea Plate under the southwest Japan of the Amurian Plate at a rate of ~6.5cm/ year. Large earthquakes and tsunamis recurred including recent events like the Tonankai (1944, Mw 8.2) and Nankaido (1946, Mw 8.3) Earthquakes. The same as the tsunamigenic large slip in the Tohoku Earthquake in 2011, the shallow portion of the Nankai frontal megathrust is also inferred to have rapidly slipped from the temperature anomaly detected by vitrinite reflectance although the age of the slip is unknown. Taking the thermal and hydrological properties around the fault into account, the slip was thought of tsunamigenic high velocity with several tens of meter of slip distance.
In 2016, April 1, Mw 6.0 Earthquake took place along the plate boundary off the Kii Peninsula and the slow slip events followed the earthquake soon after and reached almost to the frontal part of the megathust.
Lines of evidence for the tsunamigenic or slow slips at the frontal thrust are presented, whereas the slip mechanisms and their micro-tectonic process are poorly known. We therefore analyzed the micro-texture of the recovered silty sample of the fault by IODP #316 in the opportunity of core-log-seismic integration at Sea workshop organized by IODP.
Examined micro-texture indicates that the first comminution of the fault gouge is overprinted by pressure solution-like cleavages, which are in turn systematically displaced by brittle fractures or broken to micro-breccia. All these deformation processes result in the densification of the slip zone as detected by X-CT scanning of the fault zone and resemble to the micro-texture of experimentally produced fault gouges.

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