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Co-seismic high-speed thrusting in the shallow portion of an accretionary prism

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Fault slip mechanism in shallow portion of accretionary prism makes a contribution to tsunami in that its generation and scale. Especially, when the slip is fast and has large scale, generated tsunami is disastrous. Because of requiring a long lead time to induce earthquakes, however, there are some difficulties to estimate the slip mechanism using only observation seismic wave. Therefore, we performed chemical measurements, microstructure observations and numerical analysis for fault materials consisting of fault in shallow portion of accretionary prism in past times due to compare studies in Nankai Trough, an accretionary prism as of now, in material science-wise. Faults being in Boso peninsula, Japan were selected as analog faults and geological research, sampling, XRD analysis, measurements of porosity, optical and electronic microscope observation, measurements of grain size distribution and chemical analysis were performed. Observing thin section revealed existence of optical isotropic black and white part in flow structure. The black materials were observed by electronic microscope also, and evinced having typical structure of pseudotachylyte. Measurements of trace elements showed that notable element transfer. And it is suggested that high-temperature water-rock interaction could occur. These results reflect slip of high speed and large displacement, generating pseudotachylyte was occurred and thermal pressurization worked in concurrently/later slip. The temperature raised by rapid friction is assumed to be reach 1100oC, melting point of albite, and I calculated relation between slip rate and the displacement in condition of constrain that temperature reaches 1100oC. In the result, even at the most largest pressure condition and fastest slip, fault needs to slip in 1 m.

Keywords: pseudotachylyte, accretionary prism