Distribution and characteristics of fractures in the vicinity of spray fault branching off from out of sequence thrust: a case of the Sengen fault, Miura Peninsula

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Pore fluid on fault plane influences fault movement. Therefore estimation of fluid behavior of in the vicinity of a fault is important to understand deeply occurrence mechanism of earthquakes. At subduction zones, out of sequence thrusts (OST) often branch off from a decollement zone associated with making accretionary prism. OST is known to be an effective fluid flow path in accretionary prism. Fluid is expressed from deposition by lateral compression associated with making accretionary prism, and may cause high pore fluid pressure. The high pore pressure fluid may flow into cracks in the vicinity fault which are created associated with fault activity. As an evidence of the fluid migration, mineral veins such as calcite have been observed at outcrops along faults. Therefore, to research distribution and characteristics of fractures along OST is important to evaluation of fluid behavior in the vicinity OST. This study reports distribution and characteristics of fractures in the Sengen fault, which is a spray fault branching off from the Jogashima thrust, OST in south Miura peninsula. Paleo-stress conditions and pore pressure were also estimated by applying a paleo-stress analyses method of Yamaji [1] to data of calcite veins orientations in the vicinity fault.
The Sengen Fault is a reverse fault (N 84˚W, 70˚N) A fault core and the vicinity of the Sengen fault is composed of three distinct parts: a black gouge zone of about 1 centimeters thick as main slip surface, a breccia zone of about 20 meters thick on the hanging wall side, and a shear band zone on the footwall side. The gouge zone shows mineral alignment parallel to the fault plane, and the breccia zone exhibits weak mineral alignment in the orientation oblique to the fault plane in microscope scale. Fracture density decreases as a distance from the main slip surface, and when the distance is larger than approximately 100 m, the density is nearly constant. An orientation of a strike of fractures within approximately 100 m from the main slip surface is different from that of fractures which are more than 100 m away from the main slip surface in the hanging wall side, and the orientation of strike of the former is closer to the strike of the Sengen fault. Therefore, a width of damage zone, in which the fault-related fractures are distributed,) was estimated as approximately 100 m. Yamamoto et al. [2] indicated that calcite veins are commonly recognized on the hanging wall side of the fault. Calcite veins were recognized from 80-200 m from the main flip surface on the hanging wall side. A orientations of strikes seems weakly to concentrate around N 50˜80˚E. Paleo-stress analyses estimated the stress field of reverse fault (the maximum principal stress: NNW - SSE) and normal fault (the minimum principal stress: NNE - SSW) in the vicinity of the Sengen fault. Estimated pore pressure ratio for stress field of reverse fault is higher than that for stress field of normal fault

[1] Yamaji (2012) THE JOURNAL OF GEOLOGICAL SOCIETY OF JAPAN, VOL.118 , No 6, p.335-350
[2] Yamamoto et al. (2005) TECTONICS, VOL, 24, TC5008.

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