Distribution and characters of fault system in micro earthquake swarm area in central part of the Shimane Prefecture, southwest Japan

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Along a zone of central part of the Shimane prefecture to northern central part of the Hiroshima prefecture, magunitude (*M*) 5 class earthquake have occurred 6 times. In this area, numerous micro earthquakes is observed until recent days. The micro earthquake swarm zone is linearly distributed and the direction is parallel to the aftershock area of the 2000 Western Tottori earthquake (*M* 7.3). The linearly distributed micro earthquake swarm zone may reflect existence of concealed fault. However, active fault has not been reported around the zones and relationship of distribution of the micro earthquakes and geological background is also unknown. The objective of this study is to reveal the geologic structure, distribution of fault system and the characters based on the field observation on an area of the micro earthquake swarm zone.
The late Paleogene granitic rocks of the Akana granodiorite and the Ijimi granite, the Hakami volcanic rock is exposed in the study area. Basalt-andesite dikes, rhyolite dikes, and aplite is intruded into the granitic rocks.
More than 100 faults were observed in this study area. The fault plane is generally WNW strike with steeply north-dipping and NE strike with steeply south-dipping. Most of NE trending faults developed along granitic rock and dykes or granodiorite and granite. Some mm to cm thick white, light green and brown fault gouge and several cm to m thick cataclasite were observed in the faults. Fault rock of boundary fault of the Akana granodiorite and the Ijimi granite was composed of the tens of cm thick light greenish fault gouge, several m thick cataclasite, fault breccia and dozens of m of altered damaged zone. Some acidic dykes were intruded into the altered damaged zone and these dykes were not deformed. In contrast, the WNW trending faults cut the dykes and some mm to several cm thick thin fault gouges were observed within the faults. Cataclasites were not observed from the WNW trending faults.
The NE trending faults observed in this study is relatively thick with fault gouge and cataclasite. These fault plane is nearly orthogonal to the distribution direction of the micro earthquake swarms and dykes in the altered damaged zone of those faults were not deformed. These result indicates that the NE trending faults were formed in geologic period and not active at the present stress field. In contrast, WNW trending faults were developed independently of boundary of lithofacies and most of them has thin fault gouge. The orientation and occurrence of WNW trending fault are similar to the faults reported from aftershock area of the 2000 Western Tottori earthquake (Kobayashi et al., 2003; Aizawa et al., 2005). These result suggest WNW trending faults are considered as the Riedel shear planes of main fault and formed in the present stress field.

