Fracture zone outcrop exposed in the 2000 Western Tottori Earthquake aftershock region

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2000 Western Tottori Earthquake(Mw6.6) had occurred in Nanbu city, Tottori prefecture. And epicenter was in seismic gap area. We think it is very important to study structural analysis on micro scale(outcrop scale). On the other hand, Crust Dynamics project(new academic) is in progress at this area. And ultra-high density observation of aftershocks has been measured. In this study, we aimed to reveal developing process of earthquake source fault in macro scale, and focused on the following three themes.

(Ⅰ)Structural and chemical analysis in the fracture zone outcrop

At west of the Ryokusui lake(Saihaku-gun, Nanbu city), we found out large fracture zone(about 15m length, 2m width) after the outcrop cleaning. In this outcrop, brittle fracture zone along the boundary of the Neu granitic rocks(Cretaceous) and rhyolitic intrusive rocks(Neogene, Miocene) is identified. And we can observe basaltic intrusive rocks in the area. Fault gouge and cataclasite are identified inside of the fracture zone. At this outcrop, we performed the description of the detailed sketch and structural elements, and collected fault rocks to do structural and chemical analysis.

The result of the analysis, it was clear that fracture zone was formed by left-sense because of the developed Y-P-R1 fabric. We can observe calcite vein or fragment. Kaolinite, vermiculite, and chlorite are included well, and illite contains small amount. Tendency of smectite rich was confirmed in the gouge zone.

(Ⅱ)Occurrence of intrusive rocks in the vicinity of ryokusui lake

We tried to grasp the relationship between the distribution of rhyolite dikes, deformation structures and fracture zone in contact with the northern margine of the fracture zone.

Rhyolite has developed a flow structure. We concluded that the rhyolite from the asymmetric structure in the flow structure was approximately intrusion from the east direction to the west direction. Newly we discovered basalt dikes in contact with the northern margine of the rhyolite. In the observation under the microscope, organization of basalt fragments included the fault rocks is very similar to this dikes organization. In addition, we discovered the fracture zone extension in the swamp and slope in the west of the outcrop. As a result, the distribution of fracture zone with the dike is likely to be extended more than 10m to the west.

(Ⅲ) Volcaniclastic rocks around Mt.Yogai

A study of around Mt.Yogai, purpose of relationship of (Ⅰ) Fault and small fault of Hossh-ji F., and intrusion time of the intrusive rock of (Ⅱ).

Lithology of Hossh-ji F. is composed of a lapilli tuff phase and welded tuff phase. Thickness and distribution of this formations are not known. In addition,there is a gravel of fine basalt like the intrusive rocks of (Ⅱ) from a small outcrop of Mt.Yogai northwest.

Lapilli tuff phase, there is a small fault of a few mm ~ number of cm. Then, which is a conjugate relationship.

Considering host rock of fault rocks, texture and array of intrusive rocks, we presume the rhyolitic dikes intrusion event after the basaltic dikes intrusion event around this outcrop.

Fracture zone is developed at the boundary of granite and dikes, which had been already shown in the large number point(Aizawa et al, 2000 ; Manaka et al, 2012). In this study, theme (Ⅰ) and (Ⅱ) are proved it. This outcrop is located in the after shock area, and it is presumed to be located about 10m north side of the surface earthquake fault(Aizawa et al, 2000). Since shear sense are both left-lateral strike slip, they may have a common geometry. During the activities of the fracture zone, they might have experienced the movement of fluids involved in the generation of clay mineral and calcite vein. It is concluded that activity time is after the intrusion of the basalt and rhyolite, deposition of the pyroclastic rocks(Miocene), and continuing until now.

Keywords: Western Tottori Earthquake, immature active fault, fault rock, fracture zone, clay mineral, intrusive rock

