Comparative study of the active fault zone and the fault zone terminated its activity by the Late Pliocene –examples of the Atera Fault and the Median Tectonic Line in Nara Prefecture

Junichi Tsubaki[1], *Tomoyuki Ohtani[1], Masahiro Kono[1], Keiichi Ueta[2]

1. Department of Civil Engineering, Gifu University, 2. CRIEPI

The activity assessment of the active faults basically needs younger sediments. To understand the fault activity in the area with no younger sediments, it is desired that the new method is developed to study the fault activity from the fault rocks in the basement rocks. For this purpose, both characteristics of the active and inactive fault zones should be clarified. The Atera Fault zone and the Median Tectonic Line (MTL) in Nara Prefecture have studied to understand the above characteristics.
The studied exposure of the Atera Fault is located at Tase, Tsukechi, Nakatsuawa in Gifu Prefecture. In this exposure, the fault is a boundary between the Quaternary sedimentary layers and the Cretaceous granite. The fault is divided into two in the upper part of the exposure. Upper and lower faults are located in the granite and at the boundary of the sediments and granite, respectively. Toda *et al.* (1994) have clarified that the three seismic events are detected from the exposure and that the upper fault have displaced in recent two seismic events.
The studied exposure of the MTL is at Hataya, Ohyodo in Nara Prefecture. In this exposure, the MTL is a boundary between the Quaternary Shobudani Formation and the conglomerate of the Cretaceous Izumi Group. The upper Shobudani Formation with the age ranging from 1.2 Ma to 0.12 Ma have been displaced by the MTL, as shown by Matsumoto (2001). Okada and Togo (2000) reported that the MTL in this area terminated its activity by 0.3 Ma. These suggest that the MTL in this area was active at 1.2 Ma and inactive at 0.3 Ma. The top of the fault exposure had buried in 10 m depth estimated from the distribution of the terrace plain (Samgawa, 1976).
The powder X-ray diffraction (XRD) and the X-ray fluorescence analysis (XRF) were performed using the samples collected from these fault exposures. The XRD results show that smectite appears in the old fault gouge of the Atera Fault, and that plagioclase decreases toward upward in the fault gouge of the MTL. Kaolinite is detected in almost all samples, and smectite appears only the lower part of the fault gouge in the MTL. The XRF results show that MnO extremely increases in the latest slip plane of the Atera Fault, and that the content of MnO in the fault gouge of the MTL is lower than those in the Izumi Group and the Shobudani Formation. Na_2O decreases toward upward in the Izumi Group and the fault gouge of the MTL. The concentration of MnO in the Atera Fault would result from the oxidization of the fault zone near the ground surface. In the MTL, no concentration of MnO is recognized. This is supposed that manganese was concentrated in the past and it was disappeared due to the surface erosion. The distribution of kaolinite and smectite and the decrease Na_2O toward upward suggest that the fault zone of the MTL have suffered surface weathering. The surface erosion of the MTL in the studied site is estimated to be quite low from the distribution of the terrace plain. This indicates that the velocity of the surface weathering have been faster than that of the surface erosion. In the Atera Fault, the granite is uplifted due to the fault displacement, and the fault gouge is presumed to be difficult to suffer the strong weathering. Therefore, the surface weathering of the fault zone is considered to be a possible marker of the recent fault activity.

Keywords: active fault, fault zone, Atera Fault, Median Tectonic Line

