Structural analysis of fault-fracture zone and fault rocks in the Rokko fault, Arima-Takatsuki Tectonic Line, southwestern Japan

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Fault-fracture zone and their related fault rocks are closely related to the long-term activity and tectonic history of fault zone. Studying on fault-fracture structures of active faults, therefore, provide important information for accessing the long-term faulting behaviors and understanding the tectonic environment and history. This paper describes fault-fracture zone and related fault rocks developed in the Rokko fault, Arima-Takatsuki Tectonic Line (ATTL) in the southwestern Japan.

The ATTL is an ENE-WSW trending dextral strike-slip fault zone that extends for about 60 km from the north part of Rokko Mountains to the southwest part of the Kyoto Basin. The Rokko fault is a main segment of the ATTL, located in the northern Rokko Mountains, which is bounded by the Rokko granitic rocks in the southern side and Arima rhyolitic tuff in the northern side. Field investigations revealed that the fault-fracture zone of the Rokko fault ranges from 350 m to 900 m in width gradually from the west to the east, and varies in both sides of the fault, 30-50 m in the northern side and 320-850m in the southern side. Meso- and microstructural analyses show that the fault-fracture zone consist mainly of fault gouge, fault breccia, foliated cataclasite, non-foliated cataclasite, and numerous of single and network veins of crushing-originated pseudotachylyte. The fault core is composed of a 10-20-cm-wide gouge zone, which shows distinct layering structures characterized by dark-gray-brownish color layers varying from 2-3 millimeters to 10 centimeters in width.

Our results indicate that the strong deformation was concentrated in the fault core zone composed of gouge layers along the Rokko fault although the fault-fracture zone is developed in a wide zone of up to 900 m. The asymmetric distribution of fault-fracture zone on the both sides of the Rokko fault may be caused by local compress stress in a tectonic contraction area between the Arima-Takatsuki Tectonic Line and Gotsukebashi fault.