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The fragmentation and alteration history of fault rocks in the Byobuyama fault, Gifu Prefecture, central Japan.

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The Chubu region is one of the most concentrated area of active faults. These are roughly classified into two orthogonally-oriented fault sets of NE-SW and NW-SE strikes. The Byobuyama fault, 32 km in length, is NE-SW strike and located in the boundary of the Mikawa and Mino plateaus. It displaces perpendicularly the Pliocene Toki Sand and Gravel Formation by 500 m. This fault's northeastern edge has contact with the southern edge of the Atera fault of NW-SE strike and offset their displacements each other. It is clear that the activity of the Byobuyama fault has affected topographical development in this area and also plays a role of the development of the complicated fault geometry system in the Chubu region. In this study, we performed structural and chemical analyses of fault rocks of the Byobuyama fault, as a case study for improving research technique to reveal the history of active faults.

Studied outcrop is located in Rontochi area in Mizunami city, Gifu Prefecture. This is a newly discovered outcrop of the Byobuyama fault. Wide brittle fracture zone along the boundary of the Toki Sand and Gravel Formation and Inagawa Granite is identified in this outcrop. Strike and dip of the fault plane is N42E50SE. This outcrop can include the master fault of the Byobuyama fault based on the fault trend, scale of the facture zone, the relationship dividing the Toki Sand and Gravel Formation and Inagawa Granite, and with the location along the active fault trace. The fracture zone consists of light brown fault breccia ($>$30 cm thick) derived from the Toki Sand and Gravel Formation, brown fault gouge (about 30 cm thick) derived from the Toki Sand and Gravel Formation, reddish brown fault gouge (about 5 cm thick) derived from the Toki Sand and Gravel Formation, white foliated cataclasite (about 40 cm thick) derived from the granite, white cataclasite (about 30 cm thick) derived from the granite, and weak crushed granite in order from footwall to hanging wall. Deep green fault gouge injects into the foliated cataclasite. At this outcrop, we collected samples for structural and chemical analyses. Samples of non-cohesive fault rocks are fragile because of abundant swellable clay minerals. We referred to Takagi & Kobayashi (1996) and Oohashi et al. (2008) for suitable sample collection, solidification, cutting and polishing. As a chemical analysis, we performed XRD and XRF analyses.

Based on these structural and chemical analyses, the Byobuyama fault has experienced activities of several stages under different stress field. The fault rocks contain smectite, illite and kaolinite as a whole. Especially, the fault rocks derived from the granite also contain zeolite. In addition, we can see a trend that increasing Mg, Ca and LOI, and decreasing Na of the fault rocks. Degree of variability of elements is highest in the fault core.

In this presentation, we discuss the fragmentation and alteration history of fault rocks through the development of the Byobuyama fault.

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Keywords: Byobuyama fault, fault rocks, fragmentation, alteration, clay mineral