

## Examination of evaluation method for fault activity based on an observation of fault zone - 2. in-situ experiments -

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In order to establish a method for evaluating fault activity based on observation and analysis of fault zone in the basement rock, a comparative study has been carried out at outcrops of active and non-active fault. Of the three outcrops selected in the Rokko Mountains situated in southern Hyogo Prefecture, two were of an active fault and one of non-active fault. They are: the outcrop of Gosukebashi Fault at the upperstream of Gosuke-Dam site (GSB) and the outcrop of Rokko Fault at the western Funasaka (FSW) for active fault, and the outcrop of Rokko Horai-kyo Fault overlain by higher terrace deposits (HRK) for non-active fault (Kametaka et al., 2014). This paper focuses on an evaluation method which is relatively brief and easily enforceable at the outcrops, and describes the suitability of making a morphological observation of the fault plane and conducting in-situ experiments on hardness and color.

Fault plane of the active fault seems to be well continued, smooth surface and cut the older texture of the fault zone. To describe these features objectively and quantitatively, we measure 1) the relationships between the fault plane and the older texture, 2) the continuity of the fault plane, 3) planarity of the fault plane, 4) semi-quantitative observation using guideline of ISRM (Rock Net Japan, 1985, ISRM Guidelines), 5) arithmetic average toughness based on the authorized photograph. The results indicate that the fault plane of GSB and FSW show good continuities and well cut the older texture, while that of HRK show discontinuous part and poorly cut the older texture. The planarity, surface roughness and waviness, of the fault plane are well in GSB and poor in HRK, and partly poor in FSW possibly caused by the texture of alteration. The fault plane in the basement rock show relatively better planarity than that between basement rock and gravel beds. The arithmetic average toughness leads quantitative evaluation of fault plane, though there are some soluble problems about forming of outcrops and recognition of fault plane.

It qualitatively said that the fault gouge of an active fault is possibly soft and that of a non-active fault gouge is possibly hard and consolidated (Kimura, 1981, Jour. Japan Soc. Eng. Geol.). To quantify the hardness of intrafault materials, in-situ experiment of needle penetration test has been done. The result indicates that the fault gouge of GSB, FSW and HRK show 0 kN/m<sup>2</sup>. The altered cataclasite and weathered granite (damaged granite) of rock surface even show low value, while they show higher value at 20 cm below the surface. On the other hand, the fault gouge of the underground indicates still low value.

Fault gouge of an active fault possibly show reductive color and that of a non-active fault possibly show oxidative color (Research Core for Deep Geological Environments, AIST, 2012, GSJ Open File Rep.). To quantify the color of intra-fault materials, color measurements (Lab color) were done by using portable soil color meter. The results indicates that the fault gouge of GSB show low a\*value and low-middle b\*value, that of FSW show high a\*value and very high b\*value, and that of HRK show low-middle a\*value and low-high b\*value. The fault rocks around the fault gouge show intermediate value between fault gouge and non-deformed granite, indicating color change associated with weathering pass of granite.

In this paper, we show the specific contents of each measurement, and discuss about the validities of evaluation methods of the fault activity.

Keywords: active fault, evaluation method of fault activity, Rokko Mountains, Gosukebashi Fault, Rokko Fault, fault zone