

Brittle vulnerability of rocks after fluid flashing revealed by Vp measurement under hydrothermal conditions

*Noriyoshi Tsuchiya¹, Katsuya Mizuno¹, Nobuo Hirano¹

1. Graduate School of Environmental Studies, Tohoku University

Pulverizing behaviors of fault plane and fault itself were one of evidence of earthquake. In order to understand such phenomena associated with fluid, hydrothermal experiments were carried out for granite and gabbro specimens to reveal rock failure by phase change of fluid (flashing, boiling). Vp measurement was also performed under hydrothermal condition on vapor saturation curve up to 350C. After flashing, rock specimens were cooled down rapidly (150-250C cool down within several seconds). Vp of intact specimens show between 4.0 and 5.0 km/s for granite and 6.0 km/s for gabbro. After flashing from 350C, Vp of granite was less than 3.0 km/s and Vp of gabbro showed around 4.5 km/s. Those results suggested that mechanical properties of rock can not show elastic behaviors. Brittle vulnerability, particularly granitic samples, can be recognized. Those facts indicate that brittle vulnerability of fault plane by vapor flashing triggered by earthquake should be occurred.

Additionally X-ray CT image, porosity measurement, Fluorescence resin by UV light also indicate cloud fractures after fluid flashing.

Keywords: flashing, Vp measurement, fault failure, vulnerability, granite, hydrothermal condition