

Studies on shear zone geology and properties of fault materials for understanding seismogenic processes

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Acceleration of the pre-seismic slip in the deeper extension of a fault is a key issue to understanding the seismogenic process of inland earthquake. However, we do not have enough knowledge on the deeper portion of the fault for construct physical and chemical model. Therefore, we are conducted the following geological and experimental studies.

1. Geological studies on exhumed shear zone

Geological studies on exhumed shear zones were performed to clarify the characteristics of the seismogenic zone, deformation mechanism and effect of fluid phase. The Hatagawa fault zone, NE Japan, the southern part of the Itoigawa-Shizuoka tectonic line, Central Japan and the Hidaka metamorphic belt, North Japan were selected because of well exposure and well known geologic settings. The former two shear zones exhibit the brittle-plastic transition zone and the later one exhibits the deeper portion. Ductile fracture was proposed as possible mechanism of pre-seismic acceleration based on the microstructural analysis.

2. Experimental study

We designed and constructed a Japanese-original gas-medium high-pressure and high-temperature deformation apparatus. The present apparatus provides a basic environment of a confining pressure up to 200 MPa by argon-gas, a pore pressure up to 200 MPa either by argon-gas or water, and a temperature up to 800C.

We carried out a series of conventional triaxial compression tests and slip tests.

Physical properties such as specific resistivity and sonic velocity of fault rocks were measured.