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# Changes in seismic velocity and electrical conductivity in a brine-saturated granite under uni-axial compression

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Geophysical observations have shown that fluids exist pervasively within the crust. Fluids are mainly situated at intra-grain cracks and open grain boundaries. Since the opening of cracks strongly depends on the stress state, bulk properties such as seismic velocity and electrical conductivity, which are strongly affected by fluid-filled cracks, should be anisotropic under a stress state. In order to understand the anisotropy in velocity and conductivity under stress, we have been constructing an experimental system for studying the anisotropy in elastic wave velocity and electrical conductivity in a brine-saturated granitic rock under uni-axial stress.

The loading system is composed of a hand press (Maximum load: 20 kN), a load cell and stainless steel end-pieces, which contains ultrasonic transducers for velocity measurements in the axial direction. A fine grained (100-500 ?m) biotite granite (Aji, Kagawa Pref., Japan) was selected as a rock sample for its small grain size and textural uniformity. A cylindrical sample (D=26 mm, L=30 mm), to the cylindrical surface of which ultrasonic transducers are mounted for velocity measurements in the radial direction, is assembled with end-pieces, and then loaded. One compressional wave velocity and two shear wave velocities can be measured in the axial and two radial directions. Electrical impedance can also be measured in the axial and radial directions.

Preliminary runs on a dry rock sample have showed that velocities in the axial direction increased significantly with the axial compression. No significant change was observed in velocities propagating in the radial directions. These observations can be explained by the closure of cracks perpendicular or subperpendicular to the compression axis. Experiments on wet samples will also be reported in this poster.

Keywords: seismic velocity, electrical conductivity, anisotropy, fluid, compression, stress