

The effect of the temperature on stress dependence of magnetic susceptibility of the rocks

Hiroki Tsuboi[1]; Osamu Kuwano[2]; Masao Nakatani[3]; Shingo Yoshida[1]

[1] ERI, Univ. Tokyo; [2] ERI, Univ. of Tokyo; [3] ERI

Local changes of earth's magnetic field associated with large earthquakes have been reported. One of the probable mechanism is the piezomagnetic effect.

Many experimental studies for understanding details of piezomagnetic effect have been conducted, however, these were the studies under the room temperature.

Actually, at the seismic centre, the rocks under the tectonic stress are at high temperatures.

Magnetic properties of the materials vary with temperatures, so the piezomagnetic effect of the high temperatures would be different from that of the room temperature.

Thus, we have started experimental study of piezomagnetic effect under high temperatures.

The present study is the measurement of stress dependence of of the rocks' magnetic susceptibility, which is the parameter of the induced magnetization.

Remanent magnetization of materials will be smaller when the materials are heated, while magnetic susceptibility of the magnetic material will be a little larger when heated below the Curie point. So it is considered that the changes of induced magnetization under stress is larger than that of remanent magnetization at the high temperature.

So, at the present study

- 1, we developed the measurements of magnetic susceptibilities of rocks under uniaxial stresses over(?) heating the specimen
- 2, we measured the magnetic susceptibilities of the heated rocks under uniaxial stress.

We desined that the module are made of materials that have non-magnetic and thermally good conditions like ceramics for spacers and platinum for thermal couple and electrically heated wire.

We examined two rocks, which contain titanium-poor magnetite; one is tuff from Shirakawa, and the other is gabbro from Muroto.

We obtained the result that the changes of magnetic susceptibility associated with stress change under 200 degrees C is almost the same as that of room temperature.