

The effect of the water content on piezoelectric compensating charge of the bulk granites

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Electric fields caused by piezoelectric compensating charges in rocks including quartz (granite, etc) is one of the possible mechanisms that explaining electromagnetic phenomena before major earthquakes. There are a lot of experimental studies on piezoelectricity in granite, but many of them are performed under dry conditions. Water content is an important factor in electromagnetic phenomena because they change electromagnetic parameters, such as dielectric constant, electric resistivity, etc. In this study, we have studied a granite sample by changing its water content from 0 to 0.6 vol%.

We put the piece of bulk granite (3 *3 *3cm) in distilled water. Then an uniaxial stress were applied (from 4 to 9 MPa) and electric potential changes near the surface of the sample was measured. The distortion ratio of the sample was about 1%. In order to control the water content, the sample were stepwisely heated up to 600 degrees.

As a result, the peak value and decay time of the apparent electric field were strongly dependent on the water content by the sample.