Material properties and SIP characteristics of gouge

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The electrical conductivity of both the pore water and composite clay-water-electrolyte system could be measured. The measured variations would provide information to interpret the changes in the physicochemical properties of the system. The variation in shear wave velocity and conductivity during consolidation of some clays and gouges were consistent. They suggest that the application of an increment of stress to a sample that has undergone structure redevelopment over an extended time under a previous, smaller stress, causes a structural breakdown that is followed be a time-dependant development of structure, with changes in properties that cannot be accounted for by increased density alone. Chemical changes within the pore water are reflected by changes in the electrical conductivity with time.

An experimental study has been carried out on the electrical potential changes induced in fault gouge materials accompanying with their shear deformation. Some electrical polarizations were observed in common saturated fine aggregates, such as fault gouge during the sear deformation test in laboratory. This phenomenon is called SIP (Shear-induced Polarization). This phenomenon of SIP can be interpreted in terms of physicochemical interaction between fine particle and interstitial water. However, the SIP was not detected in the remolded clay for handicraft-use which treated with some non-dipole oil.

The phenomenon of SIP in fine particle aggregates is considered from another point of view to interpret the above physicochemical process during consolidation of clays.

There is a possibility of detecting the local earth current anomaly related to the earthquake occurring along an active fault.