Seismic velocities and electrical conductivity at upper- and mid-crustal depths - an inferrence from pore structures

*Tohru Watanabe[1]

1.Gradudate School of Science and Engineering, University of Toyama

Geophysical observations have been conducted to study the composition, structure and dynamics in the island-arc continental crust. Detailed profiles of seismic velocity and electrical conductivity have suggested that fluids (mostly aqueous fluids) exist pervasively within the crust. Spatial variations in velocity and conductivity are primarily attributed to a spatial variation in the fluid volume fraction. Cracks must be a key component of pores to govern velocity and conductivity at upper- and mid-crustal depths. Based on laboratory experiments, most of cracks have aspect ratios of less than 10^{-3}. The variation in velocity must be caused by that in fluid volume fraction of 0.1%. The spatial variation in conductivity is often up to 4 orders of magnitude. This large conductivity change must occur within a narrow range of the fluid volume fraction. If the connectivity of fluid is identical, the conductivity is proportional to the fluid volume fraction. A small change in the fluid volume fraction cannot make a change of orders of magnitude. The large change in conductivity requires the increase in connectivity of cracks with increasing fluid volume fraction. I will discuss about the connectivity of grain boundary cracks and its implications for seismic velocity and electrical conductivity.

Keywords: seismic velocity, electrical conductivity, pore structure

