O218-P008 **Room: Poster Session Hall** **Time: May 28**

Quantitative comparison between 1-D Vp and electrical resistivity structures -Relative role between host rock and fluid-

Yoko Morita[1]; Yasuko Takei[1]; Makoto Uyeshima[1]

[1] ERI, Univ. Tokyo

Recently, detailed 2-D and 3-D images of both seismic velocity and electrical resistivity structures can be obtained for the deep crust. These structures sometimes show a good correlation between velocity and electrical resistivity. Usually, low velocity zone corresponds to electrically low resistive zone and vice versa. This correlation can be explained by the existence of fluid phase. Quantitative comparison between seismic and resistivity structures is important to precisely estimate porosity, pore geometry and pore connectivity in the crust. However, the relation between seismic velocity and electrical resistivity structures are not always simple enough to be explained by the fluid distribution alone; low velocity zone sometimes correlates with high resistive zone and also pattern of seismic velocity structure is sometimes different from that of electrical resistivity structure. In order to derive useful information from such structures, further improvement in inversion schemes and also further study on the relationship between seismic and electrical properties of the rocks are needed. In this study, we investigated to what extent seismic velocity and electrical resistivity structures can be explained by the intrinsic properties of the host rocks and to what extent the two structures are sensitive to the existence of fluid. We used the 1-D seismic velocity and electrical resistivity structures of northeastern Japan back arc (Iwasaki et al., 2001; Matsubara et al., 2004; Ogawa et al., 2001).

First, based on the model of upper and lower crusts consisting of granite and gabbro, respectively, and without pores we theoretically predicted 1-D Vp and resistivity structures and compared them with the observed structures. On the one hand, for the Vp structure, good agreement was obtained between the predicted and observed structures, while velocity reduction due to crack and/or pore is non-negligible at depths of 10km or shallower. On the other hand, values of the observed resistivity are about 12 orders of magnitude less than the resistivity of the host rocks. Moreover, the fact that the observed resistivity does not show systematic variation with depth cannot be explained by the large temperature dependence of the resistivity of the dry rocks but is consistent with the small temperature dependence of the resistivity of water (Uyeshima, 2005). Therefore, we conclude that 1-D Vp structure can be almost explained by the intrinsic properties of the host rock, but that resistivity structure mostly reflects the properties of pores and fluids.

Then, based on the velocity and resistivity models of fluid-saturated porous rocks (Takei, 2002 and Watanabe, 2005), we estimated the porosity, pore aspect ratio, and pore connectivity which can explain both Vp and resistivity structures consistently. While Vp increases with depth, resistivity shows small variation with depth. If we assume connectivity=1, these data suggest little variation of porosity and large variation of pore aspect ratio (2 orders of magnitude) with depth, which are considered to be unrealistic. However, if we assume connectivity=0.5, these data are consistently explained by the variation of porosity with depth under nearly constant pore aspect ratio. Therefore, we conclude that connectivity is less than 1 and isolated pores exist. This conclusion can be tested by Vs data, which can provide independent constraint on the pore geometry.