Resistivity structure of the crust near volcanic front of Northeastern Japan part 3 – near Yakeishi-dake –

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On the northeastern Japan arc, activities of the low frequency earthquake in the deep crust were reported near the volcanic front (e.g. Okada and Hasegawa, 2000). The results of seismic tomography showed the low velocity zone in the lower crust concerned to the fluid path from the upper most mantle to the lower crust (Nakajima et al., 2001; Nakajima and Hasegawa, 2001). We are investigating the relation between the resistivity structure and the fluid distribution in the crust. In the former reports (Mishina et al., 2004a,b) we analyzed the resistivity structure along the survey line which passes near Naruko volcano, and gained distribution of water content in the crust. In this paper we report the result of the wide band MT survey and the result of inversion analysis of the observed data along the line which passes through near Mt. Yakeishi-dake. On the line there are low frequency earthquakes occurring to the east of the mountain in the deep crust near the Moho discontinuity. There are 15 observation points along the survey line of about 80km. One of the observation points (ESA) is the Esashi Observatory of the Geographycal Survey Institute (GSI). Observed data at all sites were processed by the remote reference technique. The magnetic data at ESA were used as a reference data for other sites. At the all observation point two components of earth current and three components of geomagnetism were recorded during one to three nights by MTU-5 manufactured by the Phoenix Geophysics Co. Ltd. The observation was performed in 2004. The observed frequency range was 320-0.00055Hz. Almost all the data except the data at observation sites within Esashi city were good enough to get accurate impedance tensors. To estimate strike direction of underground electric structure, we carried out Groom Bailey decomposition (Groom and Bailey, 1989). Consequently we adopted N22E as the strike direction. Apparent resistivity and phase data of both TM and TE modes up to 10Hz were input to the 2-dimensional inversion program developed by Ogawa and Uchida(1996).

The outlines of inversion results with respect to the distribution of seismic velocities (Nakajima et al., 2001) are as followed.

(1) The distribution of the surface resistivity are corresponds to that of Bouguer anomaly and that of surface geology. The low resistivity (conducting) area corresponds to the seismic low velocity and low density area. The high resistivity (resistive) area corresponds to the high velocity and low density area.

(2) In the upper crust, the low resistivity area exists beneath Kitakami plain. Beneath Oou Mts. and Kitakami Mts. high resistivity areas exist. Narrow low resistive zone exists within the resistive area near the fault zone of M6.2 earthquake (1970, SE-Akita Pref.). Roughly speaking the resistive area corresponds to the seismic high velocity area, and the conductive area does to the low velocity area, respectively.

(3) Beneath the middle of Oou Mts. and the western Kitakami Mts. resistive zones exist. A conducting zone exists beneath the western Oou Mts. Deep low frequency microearthquakes occur within the resistive area but near the border of the conductive area. The seismic velocity in the western resistive area is low contrary to the results in the upper crust.