

Resistivity structure of the crust near volcanic front of Northeastern Japan part 5 Near Kurikoma volcano

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On the northeastern Japan arc, activities of low frequency earthquakes 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 mantle to the lower crust (Nakajima et al., 2001; Nakajima and Hasegawa, 2003). We investigated the relation between the resistivity structure and the fluid distribution in the crust. In former reports (Mishina et al., 2004a, b; Mishina and Sugawara, 2005a, b) we showed results along two survey lines pass through near Naruko Volcano and Yakeishi-dake Volcano. In this report we show results along the survey line pass through near Kurikoma Volcano. Two groups of deep low frequency earthquake are near Kurikoma Volcano. One is just near the summit of the volcano, and the other is about 20km west-northwest of the summit. The latter is also within Sanzugawa caldera, which was formed in the late Cenozoic era.

The observation was performed in 2005 at 15 sites along the 85km-long survey line by using MTU-5 (manufactured by Phoenix Geophysics Co. Ltd.). Data were processed by remote reference technique using MT continuous observation data at Esashi observatory of GSI. After G-B decomposition of impedance tensor, we adopted N20E as strike direction for 2-dimensional analysis. By using an inversion code of Ogawa and Uchida (1996), we got 2-dimensional resistivity profile. Main features of the resistivity distribution are as follows.

(1) To the west of Kurikoma Volcano, a marked low resistivity area exists in the middle and lower crust. Its size is about 20km wide and it continues from 12km deep to the bottom of the crust. Two low frequency earthquake areas are adjacent to both sides of this low resistivity area at around 20km deep.

(2) Beneath to the east of the belt of steep gradient of Bouguer anomaly (Morioka-Shirakawa line), a marked low resistivity area exists. It continues from 5km deep to the bottom of the crust. Within this area, high activity of shallow earthquakes is seen. Kono et al. (1993) pointed out this activity as the aftershocks of 1962 Northern Miyagi earthquake (M6.5). The area corresponds to the low resistivity area revealed by Mitsuhashi et al. (2001) close to the fault plane of the earthquake.

(3) Within the upper crust of the area between two low resistivity areas of (1) and (2), there exists low resistive area. This area corresponds to low gravity anomalies of thick sediments in a late Cenozoic caldera.

(4) To the west of Kurikoma Volcano, there exists big late Cenozoic caldera, Sanzugawa caldera. Beneath the caldera, there exist resistive area in the upper crust, and highly resistive area in the western part of the lower crust. The eastern half of the lower crust is the low resistivity area mentioned in (1). From this low resistive area, narrow belt of low resistivity continues to the surface. Near the belt there exist Quaternary volcanoes, geothermal field and hot springs.