

Crustal resistivity structure beneath Naruko volcano, northeastern Japan

Koichi Asamori[1]; Koji Umeda[1]; Yasuo Ogawa[2]; Masahiro Takeda[3]; Daijiro Uehara[1]; Tsuneomi Kagiya[4]

[1] TGC, JNC; [2] TITECH, VFRC; [3] SUMICON; [4] Earthquake Research Institute, University of Tokyo

Naruko active volcano is located at the central part of northeastern Japan. A number of previous researchers have investigated the seismological structure of northeastern Japan including Naruko volcano (e.g. Nakajima and Hasegawa, 2003). They revealed some seismological evidences of fluids and partially molten materials beneath the volcano, such as seismic low velocity zone, S-wave reflectors, and low frequency micro-earthquakes. On the other hand, electrical resistivity varies significantly as functions of fluid saturation, and temperature. However, the correlation between electrical and seismological features beneath the volcano has not been clarified yet.

In this study we have estimated two dimensional (2-D) crustal resistivity structure using magnetotelluric method with far remote reference technique and 2-D inversion code (Ogawa and Uchida, 1996). The survey line is about east-west direction with 19 observing sites which were set at intervals of 2-5 km centering on Naruko volcano. In consideration of the noise environment of this region, we observed 15 hours/day for more than 3 nights at each site. In order to reduce the cultural noise, the remote reference site was set in Marumori (about 100 km away from the volcano).

The results show that a prominent conductive anomaly exists in middle and lower part of the crust beneath Naruko volcano. The location of the conductor agrees closely with a low velocity zone which detected by Nakajima and Hasegawa (2003). Low-frequency micro-earthquakes are located near the surface of the conductor. The cut-off depth of the crustal earthquakes becomes shallow toward the crater of the volcano, and it is coincident with the upper boundary of the conductive zone. These results indicate that the conductor beneath Naruko volcano may represent high-geothermal zone and partially molten materials.

References

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