宮城県北部地震活動域の３次元比抵抗構造解析

齋藤 全史郎 [1]; 小川 康雄 [2]; 市來 雅啓 [3]; 三品 正明 [4]
[1] 東工大・地惑; [2] 東工大・火山流体; [3] 東北大・院理・地震噴火予知センター; [4] 東北大・理

Three-Dimensional Magnetotelluric Imaging of a Seismogenic Region, Northern Miyagi

Zenshiro Saito[1]; Yasuo Ogawa[2]; Masahiro Ichiki[3]; Masaaki Mishina[4]
[1] Department of Earth and Planetary Sciences , Tokyo Institute of Technology; [2] VFRC, Titech; [3] RCPEV, Grad. School of Sci, Tohoku Univ.; [4] RCPEVE, Tohoku University

Northern Miyagi is located in one of the strain concentration zones in NE Japan (Miura et al., 2004). This area is known to have high seismicity and experienced two large earthquakes, the 1962 Northern Miyagi Earthquake (M6.5) and the 2003 Northern Miyagi Earthquake (M6.2). The 2003 earthquake was well studied and its focal mechanism and aftershock distribution support that the earthquake was a high angle reversed fault, which is a reactivation of an originally normal fault, created in the Miocene during the Japan opening. The surface extension of the fault is recognized as a flexure. Geologically, the area is mostly simply covered with thick sediment and is surrounded by granitic rocks of Kitakami Mountains to the east and to the north. A high magnetic anomaly under the Izu-Numa area may represent the existence of granitic pluton at depth.

The objective of this study is to image the crustal conductor in three dimensions and relate them to earthquake activities in the region. The previous studies were by 2D modelings.

We used MT data at 52 sites in total: 24 sites are new and are arranged in an approximately 2 km grid whereas two older dataset were along profiles, one NEE-SWW profile with 18 sites (Mitsuhata et al. ,2001), and one NNE-SSW profile with 12 sites (Nagao, 1997). We inverted the data using WS3dMTINV (Siripunvaraporn and Egbert, 2009)

The preliminary model showed that shallow (less than 5km depth) and deep (deeper than 5km) conductors exist: Shallow conductors represent sedimentary layers. One of them runs along the edge of the Kitakami Mountains. Deep conductors may imply an anomalous body containing saline fluids originating from slab fluids. Two deep conductors are significant. One is located at south of Izu-numa, which is consistent with the previous result of Mitsuhata et al (2001), but the distribution is highly three dimensional and tit is rather elongated along the profile of Mitsuhata et al (2001). Another deep conductor exists to the south toward the hypocentral region of the 2003 Northern Miyagi earthquake. We noticed that seismic activity is high around the deep conductors. Mitsuhata et al(2001) pointed out that the high seismicity area is imaged as a resistive anomaly, and that it probably represents a granitic pluton. Our 3d model also confirmed their result.