宮城県北部地震活動域の三次元地殻流体分布

Three-Dimensional Geofluid Distribution of a Seismogenic Region, Northern Miyagi

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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 relatively deep sediment. The objective of this study is to image the geofluid 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 with flexure, which is consistent with the previous result 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 covered by high-resistivity. The may imply the episodic migration of fluid from the fluid reservoir to the upper brittle crust triggers high seismicity.

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