

The geothermal structure in the southwestern Hokkaido

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Quaternary volcanoes, Hokkaido Komagatake and Esan in the southern part, and Karibayama in the northern part, are situated in Oshima Peninsula, southwestern Hokkaido. Even though recent volcanic activity is not seen in the central part, geothermal gradient is high. The geological structure of this region is dominated by the movement of basement blocks aligning in the north-south, and folds and fractures have developed. Many hot springs and geothermal manifestations are seen in this region where called "Yakumo-Nigorikawa geothermal zone." The Mori geothermal power plant is operating in the Nigorikawa caldera formed about 12,000 years ago. Nigorikawa and Yakumo, Kumaishi part have been thought as promising geothermal areas, so the geothermal development research (New Energy and Industrial Technology Development Organization, 1990, 1999) have been executed in various ways.

In this study, based on the investigations in Yakumo and Kumaishi area, we discussed the feature of the geothermal structure of this "Yakumo-Nigorikawa zone". In addition, I estimated the resistivity structure of Yakumo area by Magnetotelluric method (MT). With created resistivity model, we thought about the hot water circulation system in Yakumo area. And comparing with the feature of other areas, we discussed the feature of the geothermal structure of the southwestern Hokkaido.

The hot water in the Nigorikawa area is high chlorine density water and is subjected to the reaction of volcanic gas. The heat source is considered to be residual heat of volcanic activity in the Nigorikawa caldera. On the other hand, in Kumaishi and Yakumo area, from the result of the drilling survey, it is thought that the ground temperature is increased by the thermal conduction from deep heat source. In addition, the chemical componential analysis of the hot spring water and hot water of the well indicated that hot water in this area is thought to be high chlorine density water subjected to the reaction of volcanic gas and rainwater are mixed. These features are similar in Yakumo and Kumaishi area. But considering new resistivity models, there are no remarkable low resistivity bodies to continue over both areas. And comparing resistivity model and geological columnar section, the hot water in Yakumo-Kumaishi area is rising along the faults which run through the granite and sedimentary rocks. The heat source of geothermal system in Yakumo-Kumaishi area is thought as the residual heat of past magma activity, that is the heat source unlike other area where geothermal gradient is high.

Keywords: geothermal area, Yakumo, Kumaishi, Nigorikawa, resistivity structure, Magnetotelluric method