

Audio Magnetotelluric survey at Kusatsu Shirane volcano, Japan

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Kusatsu-shirane volcano is located about 150 km northwest of Tokyo. The top part of the volcano is made up of a group of pyroclastic cones arranged roughly in a north-south direction, with Motoshirane as the highest peak (2,176 m). To the north lie the active craters of Yugama, Mizugama and Karagama, opening on eastern flank of Shirane pyroclastic cone. In September 2003, an audio magnetotelluric (AMT) survey was carried out at Kusatsu-Shirane volcano. The objective of the survey was to determine the resistivity structure of Kusatsu-Shirane volcano and to investigate the underlying geothermal system.

The AMT survey consisted of 10 receiver-stations along NE-SW profile crossing the Yugama crater. Site separation is about 6 km along the profile. All of the sounding sites in this survey used Phoenix Geophysics Ltd. MTU-5A systems. The frequency range was from 10kHz to 0.3Hz.

First of all, we investigated if there is a consistent strike direction for the dataset using tensor decompositions. We chose NE-SW as a reasonable strike direction for the profile and used the decomposed impedances for the subsequent modeling. Tensor-decomposed apparent resistivities and phases were inverted using two-dimensional inversion code (Ogawa and Uchida, 1996). The most significant result was the presence of wide-spread low resistivity zone from Yugama (the peak area) to the foot at the depth of around 500 m from the surface. This anomaly does not exist west of Yugama. This implies distribution of acidic hot water. We also found the overlying resistive layer, corresponding to the surface lava flows.