

## Hydrothermal system around the Bandaiko hot spring inferred from a 3-D resistivity structure

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Bandaiko is a hot spring located in the eastern flank of the Kusatsu-Shirane volcano, 3km west from Kusatsu-Onsen. It was discovered in 1967 during excavation of a sulfur mine, and has been utilized as one of the sources of Kusatsu-onsen since 1976. It is presumed that a gush point is located in 505 m west from a tunnel entrance. The ground temperature above the presumed gush point exceeds 80 degrees. About 10 to 20 percent of the hot spring water is always discharged as vapor, so that existence of a two-phase hydrothermal system in a shallow part of tunnel end is considered to be certain. Moreover, since the chemical nature of hot spring is well investigated, Bandaiko is a suitable field which clarifies the resistivity image of a hydrothermal system.

We investigated the shallow resistivity structure around the Bandaiko hot spring using the AMT (audio-frequency magnetotelluric) method. The measurement was done on Oct.19th through Oct.26th, 2013. Five components of EM fields were measured at 19 sites around the presumed gush point: measurements were carried out during the nighttime at 15 of them with sufficient S/N. Because the measuring frequency was 1-10400Hz, information on the resistivity structure from the vicinity of surface to the depths of 1-2km can be obtained. A site for the remote-reference was not installed. Instead, a local-site-reference was applied each other. The 60 Hz noise as well as the 50 Hz noise caused by the local commercial power was extensively seen, because the survey area is located in close proximity to a prefectural border of Nagano where 60 Hz power is used.

Three-dimensional (3-D) analysis was performed in this study. A 3-D resistivity structure model was estimated from the inversion code of Siripunvaraporn and Egbert (2009) using 15 frequencies of all components of impedance data. The inferred model shows low resistivity near the end and the entrance of tunnel. In this presentation, we will report the up-to-date model of the 3-D resistivity structure and discuss the hydrothermal system around Bandaiko in consideration of the measured values of the electrical conductivity of hot spring water, etc.

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