# Integration of surface and subsurface exploration data for geothermal activity in West of the Hachimantai.

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Thermoluminessence(TL) of quarts in the volcanic rocks is expected as a effective geothermal exploration method for searching surface geothermal manifestation (Tsuchiya et al,. 2000). However, it is not clearly understood correlation between geothermal manifestation explored by TL exploration and subsurface geothermal structure explored by other explorations. In this study, we verified natural relations by integration of surface and subsurface exploration data using Geographic Information System (GIS).

Geological survey and sampling were carried out along the Tamagawa River, south of Mt. Yakeyama, Akita prefecture, Northeast Japan. The rock samples are consisted of rhyolitic tuff from the Tamagawa welded tuff. We conducted TL measurement and XRD analysis of the samples. In addition, subsurface structure was estimated by analyzing of existing subsurface exploration data of bore hole survey and electromagnetic exploration (MT method) conducted in the area of south Mt. Yakeyama.

Quartz grains were separated from rock sample by hand picking and crushed into 125-250 μm for TL measurement. TL glow curve shows peaks between 200-390 ℃ and its integral intensity was assessed as a total emission.2 points of hot spring are located at upper stream of the Tamagawa River. The result of TL shows that samples around hot springs have low intensity of TL.As a result of XRD analysis, zoning alteration of zeolite minerals were observed of around the hot spring.

According to bore hole survey, there is pre-Yakeyama lake deposit mainly consisted of siltstone under the Yakeyama lava, and montmorillonite alteration was observed in that formation (Takeno and Noda 1987). As a result of electromagnetic exploration, resistivity distribution shows that large area of low resistivity zone exist at about 500 m depth. It suggested that montmorillonite altered pre-Yakeyama lake deposit formation was observed as a low resistivity zone and it forms impermeable zone for cap-rock structure of Mt. Yakeyama. Furthermore, thermal resource was observed at center of Mt. Yakeyama at 3-5 km depth as a low resistivity zone.

We propose the hydrothermal system that cap-rock structure prevents thermal liquid rising up to surface, and it moves along impermeable zone and then spouted at the Tamagawa riverside as a hot spring. It causes TL anomaly or zoning zeolite alteration around there. Through integrating surface and subsurface exploration data, we could understand such mechanism of hydrothermal system of Mt. Yakeyama.

References

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Keywords: geothermal, geothermal exploration, Thermoluminessence

 