

Preliminary Report on Thermoluminescence Geothermal Exploration in Northern Area of Mt. Kurikoma (Akayumata-River), NE Japan.

*Hiroki Okano¹, Nobuo Hirano¹, Noriyoshi Tsuchiya¹

1. Graduate School of Environmental Studies Tohoku University

Thermoluminescence (TL) is a method to evaluate radiation dose accumulated in minerals by heating minerals and analyzing luminescence. We can evaluate geothermal manifestation through analyzing the variation of Paleodose in minerals caused by geothermal activities. In this study, geological survey was performed around Mt. Takamatsudake in the northern area of Mt. Kurikoma, and we estimated geothermal structure of the area and relation between TL distribution and geothermal structure.

In the exploration area, the Takamatsudake lava is distributed around Mt. Takamatsudake, and in the lower part, Torageyama tuff formation is distributed, and also Doroyu formation composed of mudstone is distributed in the lower part of the Torageyama tuff formation. 33 samples were collected from Torageyama tuff and Doroyu formation.

As a result of TL analysis, TL anomalies were confirmed downstream of Akayumata-river hot springs. However, no significant TL anomalies were observed around Yunomata hot springs. In Akayumata H.S (hot spring), boiling water is discharging from a few places, whereas Yunomata H.S are only spouted from one point at 50 °C. In the earthquake hypocentral distribution from 1985 to 2015, hypocentral clusters are confirmed at shallow part around 2 ~ 7 km beneath Akayumata and Yunomata H.S, and it may suggest the existence of a fluid. Around Akayumata H.S, the mud layer is exposed with a local anticline structure. We suggest that hot water discharge to the surface along with cracks and faults associated with these geological structure.

As a result of alteration mineral analysis, both the Torageyama F. and the Doroyu F. were confirmed to have a Green Tuff alteration due to chlorite and sericite. In addition, kaolinite was found near the Akayumata H.S, and laumontite was found around Yunomata H.S. and upstream of Akayumata-river. TL anomaly is harmonious with the distribution of kaolinite, but is weakly related to the distribution of laumontite. From this point of view, it is predicted that TL has information on the temperature-time effect, which is different from altered minerals. By investigating more detailed underground structures in the future and conducting quantitative analysis on the temperature dependency of TL, it is expected that the accuracy of information given by the surface TL data can be improved.

Keywords: thermoluminescence, geothermal exploration, geophysical exploration