

Characteristics of groundwater temperature distribution of deep wells in Aizu basin

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The Shibasaki Laboratory of Fukushima University has conducted a joint research, 'Analysis on Geological Structure of Quaternary and Hydrological Structure in Aizu basin' with the Shallow Geothermal and Hydrogeology Team, AIST. The laboratory has carried out studies on groundwater flow and groundwater temperature. Considering popularization of ground-source heat utilization system, comprehension of groundwater flow will be able to design more efficient system.

In this study, we collected continuous monitoring data of groundwater level and groundwater temperature. We also measured pumped water temperature and its quality from sprinkling snow-melting wells, and depth-wise temperature at an interval of 2 m in deep wells.

Groundwater level of deep wells and some shallow wells showed reduction of groundwater levels in winter. This is because snow-melting wells were operating. Most of their depths range from 150 to 200 m and their strainers are installed at multiple layers, so groundwater is pumped from several aquifers. Groundwater temperature of snow-melting wells found to be higher in the eastern part of Aizu basin. The similar trend was identified in temperature distribution maps prepared by Kaneko et al. (2014).

There are some snow-melting wells with artesian flow at the periphery of Aizu Basin and their temperatures are higher than the neighboring snow-melting wells. This is because upward movement of groundwater occurs in artesian wells. In general, temperature should be higher in the western part of the central Aizu basin which lies in downstream area. However, groundwater temperature was higher in eastern part.

Moreover, snow-melting wells in the eastern part of the basin showed higher temperature, although there is no artesian flow. In these places, the thickness of Quaternary system is small and groundwater may be pumped from not only Quaternary system but also Neogene system.

For further investigation, we will examine chemical composition of groundwater by ion chromatography.