Secular change of chemical and isotopic compositions of groundwaters in the Sho River fan, western part of Toyama, Japan

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In Toyama Prefecture, a large amount (1 million tons/year) of groundwater flows from the mountains (ca. 3000m in altitude) to the Sea of Japan side within 100 km in distance. The minimum and maximum air temperature in Toyama is 0 °C in winter and 35 °C in summer. Also, a large amount of snow falls in winter.

The geochemical characteristics of groundwaters in Sho River fan, western part of Toyama were discussed by Iwatake et al. (2013).

In this study, major chemical and isotopic (D, ^{18}O) compositions of shallow groundwater and 2 river water samples in the Sho River fan have been continuously analyzed to examine their water quality, origins and water flow in order to obtain baseline geochemical data for application of groundwater to geothermal heat pump (Geo-HP). The isotopic results show that the groundwaters are a mixture of two big river waters (Sho and Oyabe Rivers) and precipitation in the Sho River fan and that the contribution of infiltration from Sho River has increased within recent 10 years. The Sho River has higher $\delta^{18}O$ values than the Oyabe River. The shallower groundwaters are of a Ca-HCO_3 type. Secular changes of the chemical and isotopic compositions of the shallower groundwaters were observed in the wells close to Sho and Oyabe Rivers. These results show that the river waters quickly infiltrate into the fan and short residence time. According to these observed results, the suitable Geo-HP system to fit the quality and water flow mode of groundwater in each area are suggested.