

## Geochemical characteristics of the groundwater in Toyooka basin

\*Yoriko Yokoo<sup>1</sup>

### 1. Faculty of Science and Engineering, Doshisha University

The pH, EC, ORP and major ionic compositions of groundwater at 11 sites in Toyooka basin, Toyooka city of Hyogo prefecture, were determined in order to elucidate their regional and seasonal variations.

The ionic compositions of groundwater in southwestern part of Toyooka basin were same to those of steam water in the Izushi river and other tributaries of the Maruyama river. The depth of wells are shallow, 10-25 m. Their pH and ORP values showed slightly alkaline and oxic environment. EC and ion concentrations, except  $\text{NO}_3^-$ , were lower than other groundwater. These results indicate that groundwater in the southwestern part of the basin are originated from steam water.

On the other hand, the ionic compositions of groundwater in northeastern part of the basin were enriched in  $\text{Na}^+$  and  $\text{HCO}_3^-$ . The change of ionic compositions of groundwater are ascribed to groundwater flow from south to north.

The groundwater in southeastern part of the basin had high EC and low ORP values. The depth of the well is shallow, 8 m, however, the groundwater sample contained red precipitation, such as Fe oxide, indicating that the environment of the aquifer are anoxic. The concentrations of  $\text{K}^+$ ,  $\text{HCO}_3^-$  and Si were higher than another groundwater, suggesting the input of ions during weathering process.

The ionic compositions of groundwater in central part of the basin were enriched in  $\text{Na}^+$ ,  $\text{Cl}^-$  and  $\text{HCO}_3^-$ , and showed the seasonal variations. In this area, land subsidence and lowering of groundwater level occur with the increasing of use for melting snow in winter. These results suggest that the geochemistry of groundwater may show seasonal variation and the saline contamination of groundwater occur in the right bank of the Maruyama river depending on the changing of level of groundwater, although there are some saline spring water leaking along the fault in the left bank of the Maruyama river in previous study.

The ionic composition of groundwater in northern part of the basin was enriched in  $\text{Na}^+$  and  $\text{Cl}^-$ . EC and ion concentrations, except  $\text{NO}_3^-$ , were higher than other groundwater. These results indicate that the groundwater in this area is derived from the Maruyama river water effected by tidal. In eastern part of the basin, the ionic composition of groundwater was also enriched in  $\text{Na}^+$  and  $\text{Cl}^-$  and their EC and ion concentrations, except  $\text{NO}_3^-$ , were also high. These results show the existence of fossil seawater in the aquifer in eastern part of the basin.