

A look at 30 years of change in artesian groundwater chemistry in the central part of the Kanto plain

Masaya Yasuhara[1]; Kiyoji Ikeda[2]; Akihiko Inamura[3]; Masaaki Takahashi[3]; Takeshi Hayashi[4]

[1] Geol. Surv. J.; [2] none; [3] GSJ, AIST; [4] Akita Univ.

Long-term changes in artesian groundwater chemistry in the central part of the Kanto plain, Japan, are discussed by a comparison of the water analyses between the 1970s and the 2000s. As of the 2000s, groundwater with high Cl^- concentrations of more than 100 mg/l is obtained from the wells of 150-430m depths. The area with the Cl^- -rich groundwater, spreading from the northwest to southeast, corresponds with the so-called Motoarakawa Tectonic Zone (some 10 km wide by 35 km long) bounded by the faults on its longer sides. We have found this Cl^- -rich groundwater is also characterized by low $\delta\text{-D}$ and low $\delta\text{-}^{18}\text{O}$ values. Both the chemical and isotopic evidence strongly suggests the Motoarakawa Tectonic Zone divides the groundwater system in the Kanto plain into three distinct hydrologic subareas. Two faults, which delineate the Motoarakawa Tectonic Zone, act as barriers to the southward and eastward regional flows of groundwater in the Kanto plain. As a result, the Motoarakawa Tectonic Zone has been under an isolated hydrologic environment for a long period of time, resulting in the occurrence of groundwater with anomalous hydrochemistry.

A look at 30 years of change in groundwater chemistry indicates a sharp increase in Cl^- concentration from in the range 3-120 mg/l of the 1970s to 38-167 mg/l of the 2000s in the Motoarakawa Tectonic Zone and its close vicinity. In contrast, groundwater occurring outside the Motoarakawa Tectonic Zone shows an apparent decrease in Cl^- concentration from 3-45 mg/l of the 1970s to 2-20 mg/l of the 2000s. These observations support the hypothesis that a considerable amount of the Cl^- -rich groundwater of fossil sea-water origin still remains inside the tectonic zone, whereas that outside the tectonic zone has already been diluted and/or flushed out by the present-day, actively-circulating groundwater flows.