Contribution of deep-seated thermal water to groundwater in the lowermost part of Osaka Basin

*新谷 毅[1]、杉本 直人[2]、谷水 雅治[2]、益田 晴恵[1]、石川 剛志[3]、永石 一弥[4]
*Tsuyoshi Shintani[1], Naoto Sugimoto[2], Masaharu Tanimizu[2], Harue Masuda[1], Tsuyoshi Ishikawa[3], Kazuya Nagaishi[4]

1. 大阪市立大学大学院理学研究科、2. 関西学院大学、3. 海洋研究開発機構、4. マリン・ワーク・ジャパン
1. Graduate School of Science,Osaka University, 2. Kwansei Gakuin University, 3. Japan Agency for Marine-Earth Science and Technology, 4. Marine Works Japan

Osaka Basin, one of the large Quaternary sedimentary basins of Japan, hosts a large groundwater reservoir in Japan. Saline groundwaters are present in the lowermost part of the Basin, while their origins and evolution process are not clear. Deep-seated fluids from subducting slab and/or mantle are suggested to be uplifted along Arima-Takatsuki Tectonic Line and Median Tectonic Line (e.g., Kazahaya et al., 2014). Similarly to these saline groundwaters, mantle He would be associated with the groundwaters in the lowermost part of Osaka Basin (Morikawa et al., 2008). Understanding the origin and flow system of saline groundwater in the lowermost part of Osaka Basin will reveal the distribution of deep-seated thermal water relating to the tectonics. In this study, twenty-four groundwaters were collected from the Miyakojima Formation, Osaka Group, and basement rocks of Osaka Basin, and several saline waters, named Arima-type brine, are also collected from Arima spa and Ishibotoke spring. These waters were analyzed for Cl, B and Li concentrations, and hydrogen, oxygen and Li isotope ratios, and their characteristics to specify the origins are discussed.
Relationships among hydrogen and oxygen isotope ratios and Cl^- concentration of the studied waters suggested that the saline groundwaters in Miyakojima Formation were the mixture of seawater and meteoric water. The waters from basement rocks of mountain area were strongly diluted by meteoric water, while those beneath the plain were enriched in ^{18}O with increasing Cl^- concentration, a typical characteristic of Arima-type brine.
Relative chemical compositions of B-Li-Cl showed that the saline groundwaters in Miyakojima Formation were enriched in B, suggesting mixing of seawater and interlayer water dehydrated from clay minerals. While, many of those in the basement rock and Arima-type brines were enriched in B and Li, and such compositions were similar to those originated from volcanic and metamorphic fluids. The studied waters also had low lithium isotope ratio (δ^7Li <+9‰), suggesting a high temperature interaction with rocks distributed along active faults; Arima-Takatsuki Tectonic Line, Uemachi Fault, and Uchihata and Kawachinagano Faults in the southern mountains. These groundwaters would include deep-seated water similar to the Arima-type brine.

キーワード：地下水、深部流体
Keywords: groundwater, depp-seated fluid

