# Relationship between occurrence of mercury in groundwater and active faults in Sennan area, Osaka Prefecture

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Thirty one groundwaters containing detectable mercury was found among 4513 groundwaters monitored by Osaka Prefecture based on the Water Pollution Control Law. Most of those were found in the two areas; i.e, northeastern part of the prefecture along the active Ikoma Fault system(Osaka Prefecture, 2009), and the southwestern part of it. The mercury was mostly inorganic and two groundwaters from Hirakata, in the northeastern area had $\delta^{202}$Hg of groundwater was -0.65‰~-0.85‰ indicating geogenic of these mercury(Sakamoto et al., 2016). This study was planned to reveal the origin of mercury in the groundwater of southwestern Osaka Prefecture and the relationship of occurrence of mercury to active faults.

The groundwater was sampled from 27 wells in August 2016 in December in Kishiwada and Izumi cities. All the wells were <10m depth, and the water levels ware 1~2m from the ground.

This study area includes the wide plateau comprising the Pleistocene sedimentary rocks at the center and alluvial low land along Osaka bay, and Ryoke Granite is exposed on the southern Izumi mountains. Sennan fault runs on the border between alluvial low land and plateau along coast of Osaka bay, Uemachi fault runs from north to south in the center of the study area, and Uchihata fault borders the plateau from Ryoke Granite. Many small faults accross these faults. The faults appear has large flexure zones in the Pleistocene stratum. No groundwater contains excess mercury than the value (0.5ppb) in this study, while several ten ppt mercury was detected from 14 wells, and the highest concentration was 200 ppt, of which well was located near the Uemachi fault. The wells containing mercury were found mostly near the Uemachi fault, and aligned along it. Also, some other wells including mercury were found along the Sennan fault.

Major chemistry of the studied groundwaters were $Ca^{2+}$-$HCO_3^-$ and Na-Cl- ($SO_4$+$NO_3$) types, and the waters containing mercury tended to include $SO_4^{2-}$ and $NO_3^-$ more than the others. Such an characteristic is different from the major chemistry of the mercury-detected groundwaters in northeastern part of Osaka Prefecture, previously studied. In that area, mercury concentration of groundwaters including anthropogenic component such as $SO_4^{2-}$ , $NO_3^-$ and $Cl^-$ was lower than $Ca^{2+}$-$HCO_3^-$ type grandwaters. The $NO_3^-$ and $SO_4^{2-}$ would be oxidants to ionize gaseous mercury in the studied groundwaters. The mercury would be captured in aerobic groundwaters after issuiing from the deep along the faults in this area.

The fluids released from the subducting slab are found in many place of the Japanese islands. It is reported that saline waters were found in such places, where coincidentaly epicenters of Deep low-Frequency earthquakes occurred(Kazehaya, 2014). Deep low-Frequency earthquakes were observed in our studied areas where geogenic mercury was detected in the groundwaters. In this study area, many active faults belonging to the Uemachi fault system including conjugate faults and flexure zones in Osaka group(Pleistocene sedimentary formation). Combining those observations, the mercury would be released in association with dehydration of slab fluid and issue along the active faults. The origin of mercury will be

 

revealed by analyzing mercury isotope ratio of groundwater and soil gas.

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