Geophysical Research Abstracts
Vol. 20, EGU2018-2129, 2018
EGU General Assembly 2018

Using Pb Isotope as an indicator of the source of Arsenic Pollution

Cheng-Yueh Yang
National Chung Cheng University, Earth and Environmental Sciences, Taiwan (bluer951@gmail.com)

The Guandu Plain in Taipei City, the capital of Taiwan, has been highly polluted by arsenic (As) from the Huang-Gang Creek for a long time. The source of As in the Huang-Gang Creek is still controversial. In general, the Huang-Gang Creek is originated from Tatun Volcanic Group (TVG), which has extensively post-volcanic activities. The pH value of water is as low as 4. In the upstream of the Huang-Gang Creek has two major spring outcrops, the Di-Re Spring and Liou-Huang Spring, which are only one kilometer way. In addition, their geological settings are the same. However, the As concentration in the Di-Re Spring is obviously higher than that in the Liou-Huang Spring. With multivariate-statistical analysis and Pb isotopes, this study collected and analyzed eight samples along the Huang-Gang Creek to determine the differences of chemical processes.

The results of principal component analysis (PCA) show the eigenvector for first principal component (PC1) has high loadings in most of chemical compositions, especially As, Pb, Si, SO_4 and Pb isotopes. This confirms that Pb isotopes can reveal the source of As. The results of Pb isotopes demonstrate the isotopic ratio of water sample in the Liou-Huang Spring (the sample with low As) has very low $^{206}Pb/^{204}Pb$ value, which is highly different from other samples. On the contrary, two other water samples, obviously only recharged by Liou-Huang Spring, have high $^{206}Pb/^{204}Pb$ as that from Di-Re Spring. It is believed that the two samples were also affected by the Di-Re Spring due to underground recharge. However, most samples with high As concentrations have $^{206}Pb/^{204}Pb$ value of about 18.5, which is similar to local andesitic rock and the low $^{206}Pb/^{204}Pb$ value of unpolluted water is similar to meteoric water, which represent a deep degree of water-rock interaction and short circulation of surface water, respectively. An inverse hydrochemical thermodynamic model will be conducted for depicting the mechanism of As pollution due to the water-rock interaction between water and local andesitic rocks.