Geophysical Research Abstracts
Vol. 20, EGU2018-6317, 2018
EGU General Assembly 2018

Using Pb isotopes as a tracer of anthropogenic heavy metals from a copper smelting plant

Chieh-Yu Huang

National Chung Cheng University, Department of Earth and environment science, Taiwan (angel2424003@hotmail.com)

Traditionally, lead isotope is one of the most important tracers to determine the sources of geological material due to its conservative behavior during almost all biochemical and geochemical reactions, which means that the ratios among lead isotopes (^{208}Pb, ^{207}Pb, ^{206}Pb and ^{204}Pb) could keep constant in the environment. During the recent decades, lead isotopes have been extensively applied to the investigations on the environmental subjects, such as the environmental impact of leaded gasoline and the source of atmospheric suspended particle matter. In this study, lead isotope would be used as an indicator of anthropogenic copper pollution in soils.

The copper-polluted soil was collected from a copper smelting plant in the south Taiwan. The polluted soil was packed in a column and was saturated with deionized water for 24 hrs. The heavy metals in the soil were leached with continuous 0.5 M HCl solution in an average flow rate of 0.35 ml/min. It took about 5 hrs to reach the peak value of 7659 ppm of copper in leaching solution. During the leaching process, $^{206/207}$Pb ratio gradually increases but its peak value reaches about 8.6 hrs later than the copper. In addition, the time that $^{206/207}$Pb ratio returns to the background is identical with that copper does. This demonstrates that Pb isotope is not only capable of indicating metallurgical activities but also can evaluate the efficiency of treatment of contaminated soils. In addition, the geochemical results are analyzed with multivariate statistical method (PCA) in this study. Two major principal components (PC) can be extracted. Most of the heavy metals have high loadings in the first PC, which obviously corresponds to the effect of metallurgical activity in the study area. The second PC with high loadings for As and V shows a delay time of about 1.5 hrs during leaching column test. It should be taken care of in the treatment procedures of removing heavy metals.