

Tracing Lead and Cadmium Contamination Sources in Soils Using Lead isotope compositions

YI HUANG, ZHIJIE LONG, SHIPENG ZHANG,
YING CHEN, CHAO LIU, RUI WANG, RUOHENG
WANG

College of Earth Science, Chengdu University of Technology,
Chengdu 610059, China. huangyi@mail.cdut.edu.cn

Tracing Heavy metal sources in the environment is important for understanding their natural circulation on earth's surface. Pb isotope ratios are relatively stable and easily to be measured, which are rarely affected by later geological geochemical processes. Therefore, lead isotope value play a unique advantage role in the study of trace elements like Pb and other sulphurous heavy metal elements[1]. Panzhihua is a typical mining city in China, it has one of the large V-Ti magnetite ore deposits in Asian. Nearly half a century of mining development has caused unusual high levels of heavy metals such as cadmium in the soils.

In this study, the concentration values of heavy metals in soil and end element samples collected from this area were measured by ICP-MS. Lead isotope ratios of all samples were determined by MC- ICP-MS. By using the Pb isotope tracing method, a multivariate mixed model was established, and the numbers and contribution rates of the end elements were determined. The results showed that Pb and Cd in this area existed moderate to strong pollution and similar concentration distribution characteristics with significant homology in the soil.

Soil profile data indicated that the soil has been contaminated in the area, and most of heavy metals enriched in the surface soil. $^{206}\text{Pb} / ^{207}\text{Pb}$ ratios revealed that the soil was mainly affected by steel smelting and coal combustion. And the migration of Pb in the coal-burning component is stronger than that in the smelting slag. Through the calculation of the model, it was determined that the situation of slag disposal pit was in accordance with the binary mixing model, in which the contribution rate of coal combustion and steel smelting were 38.85% and 61.05%, respectively.

[1] Cloquer C, Carignan J, Libourel G, et al. Tracing Source Pollution in Soils Using Cadmium and Lead Isotopes[J]. Environ.Sci.Technol. 2006, 2006(40): 2525-2530.