The Micro Morphology, Heavy Metal Concentration, Cadmium and Lead Isotopic compositions of Atmospheric Dust in a typical mining area, Southwest of China

YI HUANG[1, 2]*, JINJIN WANG[2], TING LI[2], LI WANG, MIN HE[2], TING SU[2], XIN CHENG [2], SHIJUN NI[1]

[1] State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu University of Technology, Sichuan 610059, China

[2] College of Environment, Chengdu University of Technology, Sichuan 610059, China

[3]huangyi@cdut.cn

Urban atmospheric dust has become an important carrier of heavy metal contaminants, which eventually settle in the residential area, and lead to potential hazard to the public health. Panzhihua city located at the important tectonic-metallogenic ore forming belt in southwest of China, where 76 kinds of ore resources have been found. Affected by mining activities, the air pollution is worrying. It is urgent to understand the atmospheric status and the pollution sources in Panzhihua city. In this study, 31 dust samples were collected from traffic, residential, and industrial areas in Panzhihua city. To better understand the characteristics and sources of heavy metals, Pb, Zn, Cr, Cd, Cu and Ni were analyzed by inductively coupled plasma mass spectrometer (ICP-MS). The microscopic morphology and elemental composition of particles in atmospheric dust were measured by SEM-EDX. Cadmium and lead isotopic compositions ($^{114}Cd/^{110}Cd$, $^{206}Pb/^{207}Pb$, $^{208}Pb/^{206}Pb$, and $^{208}Pb/^{207}Pb$) were determined by MC-ICPMS. The results showed that the trace elements concentrations in atmospheric dust in Panzhihua city exceed the soil background values in Sichuan province and in China, and most of them reached the pollution levels. SEM-EDX analysis shows that the morphology of the particles in atmospheric dust in Panzhihua featured with spherical, massive, columnar, layered, and irregular, and the minerals are mainly composed of calcite, quartz, hematite, gypsum, and feldspar. The isotope studies showed that the main sources of cadium and lead in atmospheric dust are smelting, motor vehicle exhaust, and soil (background). Based on the results of the isotopic ternary mixed model, these sources accounts for an average of 50.9%, 29.5%, and 19.6% of the lead, respectively. The results are beneficial to provide a theoretical basis for improving its atmospheric quality.