Characteristics of trace metals in PM_{2.5} and PM₁₀ particles and the health risk assessment in a typical mining city of dry-hot-valley area of China

XIN CHENG, YI HUANG^{*}, HUILIN LU, SHIJUN, NI, ZAIDONG, LIU, NINGMEI, WANG

College of Earth Science, Chengdu University of Technology, Chengdu 610059, China

*Corresponding author E-mail: huangyi@cdut.cn

Ambient particulate matter (PM) and associated trace metals is one of the most important environment problem in Panzhihua city. Three monthly 24 hour samples of airborne particles ($PM_{2.5}$ and PM_{10})were collected from one rural and three sites during April 2014 to January 2015. Mass concentrations of trace metals (Cd, Cr, Ni, Cu, Co, Mn, Pb, Zn and V) in $PM_{2.5}$ and PM_{10} were determined by ICP-MS. Temporal and spatial variations of airborne particles and associated trace metals were discussed. Enrichment factor and principal component analysis were used to indentified the possible source of metals in air. Potential health risk posed by the individual metals upon inhalation were calculated using the EPA health risk model for both adults and children.

Fig. 1: The enrichment factors of elements in PM_{2.5} and PM₁₀,



Panzhih City

The results show there were about 60% to 100% PM₁₀ samples and 60% to 80% PM25 samples are exceed the recommended 24 hour limit values in industrial area. Measurements of PM in dry and rainy season showed notably high concentration in dry season. Trace elements in the PM25 and PM10 were measured and found Cu, Pb, Zn, Mn and V were the most abundant elements, which are related mostly with fuel combustion. In contrast study, trace elements were preferentially presented in fine particles. Due to effected by its geograpic feature and climate conditions, the concentration values of trace elements observed were 2~10 times at industrial sites higher than that of urban residential site. The study area can be considered one of the highly polluted industrial areas with respect to metal species comparing with other industrial cities. The significant increase of the concentration of trace metals at the industrial area compare to residental and rural data generates additional health risk for people living near this area.