# Variation in lead isotopic compositions in Mongolian soils

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Asian continent is a major source of natural dust and pollution (Simoneit et al., 2004). It has a marked influence on the atmospheric chemical compositions to the regions nearby (Clarke et al., 2004). Likewise, fingerprints of Pb stable isotope from Gobi in the southern Mongolia were observed in the Chinese Loess Plateau (Wu et al., 2011). The magnitude of Pb stable isotopic ratio, therefore, can be used in tracing Pb pollution and also the origin of geological formations. Current survey aimed to quantify Pb isotopic signatures in Mongolian rural and urban soils. This information was still missing and it should provide valuable baseline data on Mongolian sources.

Countryside of Mongolia is a pristine environment due to its sparse population and low industrial activity compared to the capital city of Ulaanbaatar. Average concentration of Pb in urban soils (20.35 to 54.71 $mg \cdot kg^{-1}$) is twice the values that are found in the rural soils. Furthermore, covariance of Pb stable isotopic compositions showed two distinct groups between rural and urban soils as pristine and disturbed sites. The $^{206}Pb/^{207}Pb$ ratio was 1.163–1.185 for the urban soils, whereas values for rural soils (1.186–1.207) were analogous to regional natural fingerprints. Coal is one of potential Pb pollution sources in Ulaanbaatar and has high radiogenic properties in terms of Pb isotopic compositions, and revealed an average of 1.25 for $^{206}Pb/^{207}Pb$. Thus, contributions from coal firing activity to Pb pollution are assumed to be lower than it was thought. The depressed values measured in urban soils may be ascribed to the mixing of less radiogenic Pb used as an additive in such products as gasoline. The $^{206}Pb/^{207}Pb$ ratios for roadside soils from the city, however, were higher than those for the imported leaded gasoline and vehicle exhausts. Thus, vehicle exhaust and coal combustion appear to have a competing influence on the Pb isotopic composition of urban soils. Only available data on Ulaanbaatar aerosol from 1995 were comparable to the urban soil $^{206}Pb/^{207}Pb$ composition giving value of 1.163; therefore, it is reasonable to conclude that Pb pollution source in Ulaanbaatar is nearly constant local source.