Accumulation and mobility of traffic related metals in roadside soils in Shanghai

GENG YAN[1], LINGCHEN MAO[2] AND LING CHEN[1]

[1]Tongji University, 1239 Siping Road, Shanghai, P.R. China (yangeng@tongji.edu.cn, *correspondence: chenling@tongji.edu.cn)

[2]University of Shanghai for Science and Technology, 516 Jun Gong Road, Shanghai, P.R. China (*correspondence: mao.lingchen@usst.edu.cn)

The road traffic has become one of the main sources of urban pollution and could directly affect roadside soils. To understand the enrichment and mobility of traffic related metals in roadside soils, 10 trace metals (Sb, Cr, Co, Ni, Cu, Cd, Pb, Hg, Mn and Zn) from two urban/rural roads (Hutai Road and Wuning-Caoan Road) were analyzed in this study. The results indicated that Sb, Cu, Cd, Pb and Zn were mainly controlled by traffic activities. The contents of these metals in roadside soils showed a decreasing trend with distance to the road edges. According to the enrichment factors (EFs), 78.5% of Sb, Cu, Cd, Pb and Zn were in moderate or significant pollution. In particular, recently introduced in automotive technology, accumulation of Sb has been recognized in 42.9% samples of both roads.

Besides, more than 50% of the total concentrations of Cd, Pb and Zn could be counted as part of the mobile fractions (including acid-extractable, reducible and oxidizable fractions), suggesting the strong mobility of these metals in roadside soils. While Sb and Cu were mostly in residual fractions. In addition, the pools of labile Cu and Pb in soils were also estimated with isotopic dilution. The E-values of Cu and Pb were 7.35 and 37.67 mg/kg, respectively. Compared with sequential extraction of BCR approach, the amounts of liable Cu were comparable to the mobile fractions. However, the liable pool of Pb was lower than its mobile fractions, indicating that the mobility of Pb in roadside soils may be overwstimated by sequential extraction.