Human health risk assessment of heavy metals in PM$_{10}$ of road deposited sediments (RDS) in the major industrial areas along the coast of South Korea

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With urbanization and industrialization, increased motor vehicles for transportation of the population and industrial goods have given rise to increase road deposited sediments (RDS) along the roadside in industrial areas. Resuspension of RDS is one of the major sources of particulate air pollution in industrial areas. Particles below 10 μm diameter (PM$_{10}$) in RDS (PM$_{10}$ RDS) can be a reservoir of large amount of hazardous pollutants and resuspension of those PM$_{10}$ RDS can be important carrier of pollutants to city dwellers and pedestrians. RDS contain several inorganic and organic pollutants such as heavy metals, metalloids and polycyclic aromatic hydrocarbons which have adverse effects , such as carcinogenic and non-carcinogenic effects, on humans.

The aim of this study is to investigate metal levels in PM$_{10}$ RDS in the major industrial areas along the coast of South Korea. PM$_{10}$ fractions were directly separated from total RDS collected at 165 sampling sites in the 9 large industrial areas in December 2014. The mass concentration of PM$_{10}$ RDS samples ranged from n.d. to 470719 (8555±7722) mg/m^2. The mean values of heavy metals were 893, 258, 1223, 7501, 194, 29.6, 2539, and 2.39 for Cr, Ni, Cu, Zn, As, Cd, Pb, and Hg, respectively. Cu, Zn and Pb, vehicle-related pollutants, showed the highest levels in PM$_{10}$ RDS from Onsan industrial complex. Because resuspended PM$_{10}$ RDS can potentially give hazardous effects to the residents and workers living in these areas, we also assessed the human health risk of heavy metals in PM$_{10}$ RDS in these study areas.