Mercury stable isotope compositions in airborne particulate maters in remote areas of China

FENG XINBIN[1,*], FU XUEWU[1], ZHANG HUI[1]

[1] State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, China

Fine airborne particulate matters (PM2.5) were collected weekly at four remote sites in China. The averaged mercury (Hg) concentrations in PM2.5 at the studied sites ranged from 18.9 to 46.1 pg m^{-3}, which are 2-5 times greater than that observed from the North America and Europe. We identified that long-range transport from industrial and urbanized areas played a primary role in distribution of Hg in PM2.5 in remote areas of China. Hg in PM2.5 overall displayed negative δ^{202}Hg values ranging from -2.5‰ to -0.30‰. Hg isotopes fractionation during atmospheric transformation including oxidation of Hg^0 in the atmospheric followed by gas-particle partitioning could induce negative shift in PM2.5 δ^{202}Hg values. We also observed significant mass independent fractionation (MIF) in PM2.5 with Δ^{199}Hg values ranging from -0.20‰ to 1.17‰. As most of high PM2.5 Hg samples were directly related to anthropogenic Hg emission in mainland China, we suggest that PM2.5 released from anthropogenic sources of China were characterized by Δ^{199}Hg values near zero. Atmospheric processes including oxidation of Hg^0 and photo reduction of PM2.5 Hg are thought to drive isotopic composition of PM2.5 Hg toward high positive Δ^{199}Hg values.