Mercury Speciation at A Suburban Site in the Mid-Atlantic United States: Seasonal and Diurnal Variations and Source-Receptor Correlationship

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Abstract Factors influencing diurnal, seasonal and inter-annual variability in mercury speciation over Mid-Atlantic US were investigated using multi-year measurements from 2007 to 2012 conducted at a suburban site in Beltsville, Maryland. Average concentrations and standard deviations were 1.43±0.31 ng m^{-3} for gaseous elemental mercury (GEM), 5.0±39.7 pg m^{-3} for gaseous oxidized mercury (GOM), and 8.5±66.7 pg m^{-3} for particulate bound mercury (PBM). Diurnal variation of GEM shows a slight peak in GEM concentration in the morning, likely due to rush hour traffic. Seasonal variation of GEM shows lower levels in fall. Both diurnal variations of GOM and PBM show peaks in the afternoon likely due to photochemical oxidation of GEM. Seasonally, PBM measurements exhibit higher levels in winter and spring and lower levels in summer, while GOM measurements show high levels in early summer and late fall and low levels in winter. Despite significant emission reduction of SO_2 and NOx in the nearby power plants since 2009/2010, there were not significant reduction in GEM, GOM and PBM, indicating that long range transport or the global mercury pool dominates the mercury concentrations at this suburban site in the Mid-Atlantic United States

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